

NOVEMBER 1996

HP Professional

**The DCE
Odyssey**

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Application Development Code Less And Prosper

SPECIAL GUIDE

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Mass Storage: The Search For Space

- Return Of The Tape
- A Space Case
- Orbiting Memory Prices

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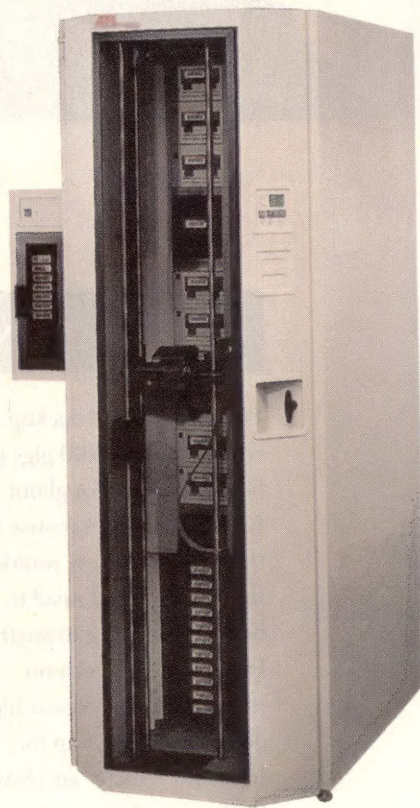
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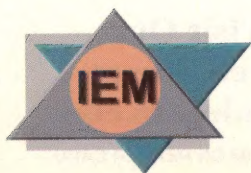
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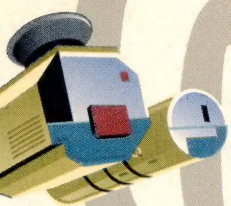
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It's All DCE, Once You Get Past The Pain

By Frank Teti

More and more, applications technologically, as well as geographically, span the enterprise. At this point, the only option to do this successfully is the Open Group's DCE.

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Driving Miss DCE

By Jon William Toigo

Until now, support for DCE was based mainly on anecdotal accounts. Now, benchmarks put out by the TPC are providing empirical evidence to back up these claims.

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Most enterprises find their data storage requirements growing more than 30 percent a year. As information becomes the core of business, safeguards against failures take on a new urgency.

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Memory isn't glamorous, but it's still a necessity. And all too often, it takes a back seat to most technologies; but, you still have to pay for it. So what trends are in store for memory prices?

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Microsoft develops NT for Intel's IA-64 CPU; HP/SCO announce second draft of API for 3DA UNIX; Intel's "Wired for Management" seminar; HP Enterprise Desktop Management Services; WRQ acquires Express Systems; Relaxed DES export restrictions; DWI advises about consultants; SIA reports on a global ITA; HP/UN provide technology to third-world countries. . 8

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& Another Thing...: The Great NT Debate *By Nick Savander*

Window. NT versus UNIX has taken on an emotive tone, disproportionate to the relevance of Windows NT or even UNIX. When will the IT industry learn its lesson and realize that customers drive the computer industry, not IT vendors? 64



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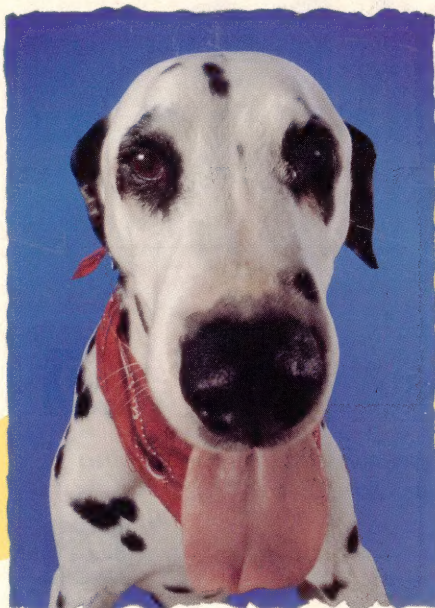
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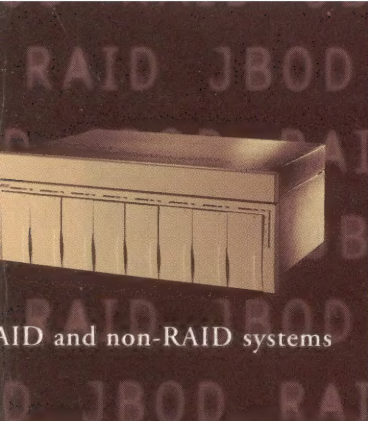
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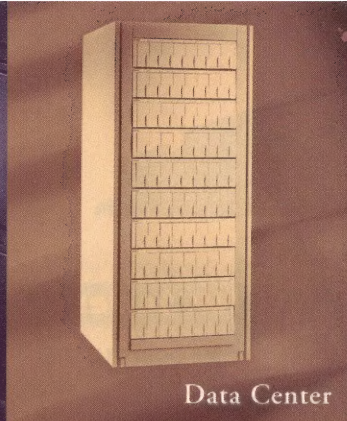
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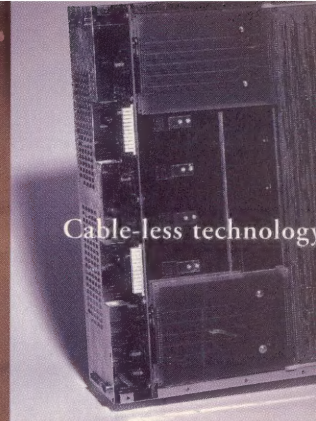
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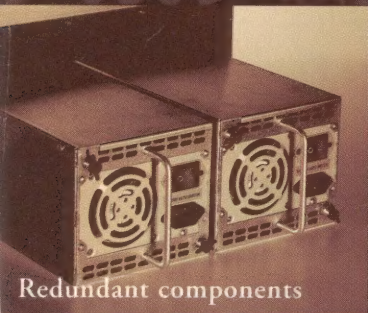
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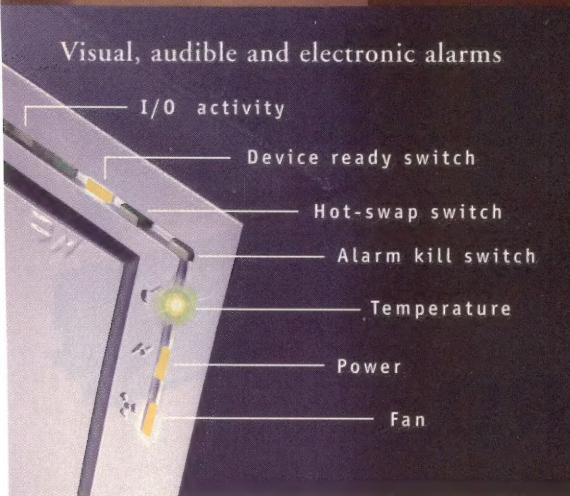
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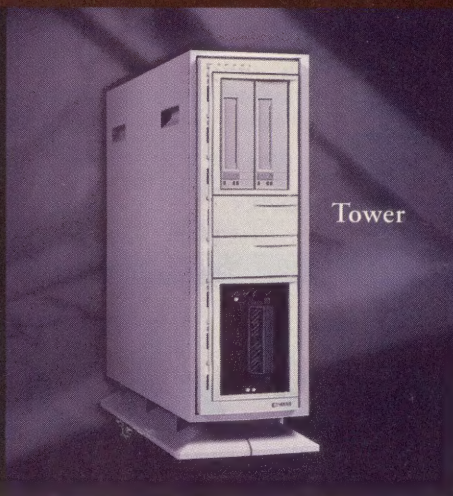
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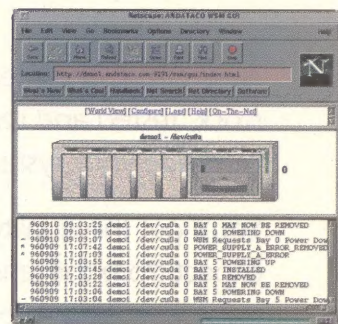
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To Everything...

When it comes to getting comprehensive information on the HP enterprise, we answer the question "What do you, our readers, have time for?" With the goal of being the number one, single source for coverage in the HP market, *HP Professional* is expanding its editorial focus beginning with the January 1997 issue.

Consequently, *HP Professional's* new editorial content will reflect the impact that UNIX and Windows NT have on IT professionals using HP computing products. We believe that it's important for IT managers to understand where HP is taking its customers in the next century.

Some of the changes that will help *HP Professional* reinforce that commitment include: a redesign that accommodates your immediate information needs; a tag line that emphasizes our commitment to UNIX, Windows NT and HP's Business Server systems, including the future of the HP 3000; columns that focus on the Internet and Windows NT; an expanded Editorial Advisory Board which includes HP executives and high-profile IS managers who are implementing HP 9000s, PCs and the HP 3000 in client-server environments; in-depth features on topics such as integrating UNIX and PCs, corporate intranets, data warehousing, Internet security and distributed computing; and case studies on HP 3000 client-server solutions.

Popular columns, like Fred Mallett's *UNIX At Large* which covers HP-UX tips and tricks and Jill Huntington-Lee's *Inner Networking* which analyzes HP OpenView and the systems and network management market, will continue to be an important part of our mission to deliver unbiased reporting and analysis. Increased reader interaction through technology-specific surveys will help us, as well as industry players, better understand your concerns and the issues you face. And, practical sections such as *Strategic Directions*, *Product Watch* and *New Products* will introduce you to new vendors and bring you the latest hardware and software without the fluff and puff.

We also will continue to enhance our Web site — the *HP Professional Web Edition* — which has already gotten a lot of attention from IT professionals who are not only dealing with HP-UX and Windows NT, but also with distributed, computing environments as well.

Our European edition, *HP Professional Europe*, already known as "the magazine for HP's installed base," will also reflect the expanded focus, while continuing its leading, independent pan-European coverage of HP to the largest subscriber base of HP computing users in Europe.

To further cement our commitment to delivering clear technology information, the publishers of *HP Professional*, Cardinal Business Media, has named Thomas J. Wilson as vice president and general manager of our Information Technology Group. The newly named group consists of Cardinal's eight major IT publications including *Digital Age*, *ENT*, *Enterprise Systems Journal*, *HP Professional*, *HP Professional Europe*, *INTERNETWORK*, *MIDRANGE Systems* and *Unisphere*. Cardinal's Applied Technology Group also publishes *Imaging World* and *EC.COM*.

No stranger to the world of computer publications, Wilson began his career in technology publishing in 1992 when he took over IDG's *Network World* as advertising director. For the past two years he served as associate publisher of CMP's *Netguide*.

Wilson believes "HP is prepared to propel itself to the number one vendor for Windows NT and UNIX integration solutions, while still maintaining its loyal installed base. As *HP Professional* begins its 11th year in the market, delivering to the largest and purest subscriber base of HP computer users, our commitment remains the same: To bring you a reasonable and independent analysis of HP's strategies, products and promise."

Earlier this year, Lew Platt predicated in an interview with *HP Professional*, that in the next few years "there will be two operating systems — UNIX and NT." This quote did more than cheese off a few proprietary users and got the listservs smoking with cries of a reverse revolution. Well, start *that* revolution without me.



**Charlie
Simpson**

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INDUSTRY WATCH

George A. Thompson

MICROSOFT ENDORSES THE POST-PENTIUM GENERATION...

In September, during Network+ Interop, Microsoft officially announced that they are developing Windows NT for Intel's Intel Architecture-64 (IA-64) — the company's post-Pentium 64-bit CPU series. The first implementation of the IA-64 will be unveiled with the introduction of Intel's much anticipated Merced CPU. Expected within the next two years, Merced will not only run Windows NT, but HP's next generation 3DA UNIX OS (which HP is working on with SCO) as well as HP-UX binaries.

WHILE HP AND SCO READY THEIR POST-PENTIUM API

In October, HP and SCO announced the second draft of the API specification (expected to be officially published before the end of 1996) for their next-generation UNIX operating system. The specification converges selected APIs for HP-UX, SCO UnixWare and SCO OpenServer. Optimized for the Intel IA-64 CPU, the new OS will be designed using a so-called three-dimensional architecture (3DA) named for the three design dimensions that it features — modular functionality, CPU and system optimization. HP and SCO intend to "flow" the next generation UNIX into HP-UX and SCO Gemini (their current OSes) and make it available to other system vendors for their platforms. For more information, see Industry Watch, *HP Professional* April 1996.

A matrix format summary of information about the APIs — listing the APIs, their origin and the standards they support — is available on the companies' Web sites:

www.hp.com/go/3dunix and
www.sco.com.

NOTABLE QUOTABLE

**“Windows NT will find
its place in customers’
IT strategies.”**

— Nick Savander, Director of Sales,
Technical Computing, HP CSO Europe

SO, CAN HP BREAK OUT OF ITS UNIX SHELL?

“To fully exploit Merced's 64-bit capabilities, existing software, including operating systems, middleware and applications, must be at least recompiled and possibly redesigned,” according to a report by D.H. Brown Associates Inc. (Port Chester, N.Y.), a research firm. “The long list of objectives for 3DA UNIX in particular presents heady challenges, such as biendian application support, which have not been met in the past by development efforts in the industry. Collapsing a total of 22 million lines of code (UnixWare and HP) into a new base of 10 million lines for 3DA UNIX represents a significant software engineering challenge.

“Moreover, the major effort required to support an Intel 64-bit saps the credibility of HP and SCO's promise to simultaneously target emerging functional requirements such as integration of NetWare Directory Services (NDS) with DCE and support for Non-Uniform Memory Architecture (NUMA) systems. As a result, it is expected that 3DA UNIX will take longer and come to market in rougher shape than any of the involved players

would like to admit. Nevertheless, HP strategy builds on a strong RISC base in traditional open systems workstations and midrange servers, with the potential for a breakout in the Intel x86 commercial desktop and mass markets over the long term.”

INTEL'S WIRED FOR MANAGEMENT

Now that there are over 100 million PCs sitting out there on desktops, it's suddenly hip to be concerned about desktop management. Back in September, Intel sponsored an all-day business seminar in New York City called “Wired for Management” that was “an intensification of our efforts to make PCs universally managed,” according to Andy Grove, Intel's CEO and president.

In front of a crowd of thousands at Madison Square Garden, Grove outlined Intel's plans for the well-managed PC: “We plan to achieve our goal of a 15 percent reduction in the total cost of ownership of business PCs over the next year through the comprehensive delivery of management-enabled products, including chips, platforms and applications software.” With the overall cost of maintaining a desktop PC around \$40,000 (five-year average) that would be about a savings of \$6,000. Intel's vision was supported by the following companies in attendance at the event: Compaq, Computer Associates, HP, IBM, Microsoft and Tivoli Systems, as well as 20 PC manufacturers and software vendors.

THE WIDE WORLD OF DESKTOPS

HP got into the desktop management act by announcing the availability of Enterprise Desktop Management Services (EDMS). Concentrating on the fact that 86 percent of enterprise (networked) desktop costs (technical

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support, administration, setup, training and maintenance) are labor-intensive, HP is targeting the companies that it's hurting the most. That is, companies with 10,000 or more desktops in the United States and more than 2,000 desktops outside the United States.

Available worldwide, the EDMS will include: planning, acquisition, deployment services, LAN manage-

ment and support, and refresh services, such as PC hardware upgrades, disposition and technology-refresh finance programs that build in an option to upgrade. Target customers for the new service include CEOs/CFOs/CIOs in companies with geographically distributed client-server infrastructures (Windows NT, NetWare and UNIX environments).

WRQ CONNECTS WITH EXPRESS METER

Also seeming spurred by the desktop management trend, WRQ (Seattle, Wash.), of TCP/IP and HP 3000 connectivity fame, is branching out — so to speak. By acquiring Express Systems, a neighboring Seattle software firm, WRQ is entering the software man-

HP UNITES WITH UNITED NATIONS

This past August, HP and the United Nations announced a joint alliance of a different kind.

Displaying a well cultivated sense of global "corporate citizenship," HP agreed to donate an assortment of computing equipment and consulting services to the UN Development Programme (UNDP). While priority is given to eliminating poverty and building healthy economies in developing countries, the UNDP's ultimate goal is to help build those countries' capacity to achieve what they call *sustainable, human development (SHD)* through an autonomous initiative called the Sustainable Development Network Programme (SDNP).

In simple terms, "it's really technology with a human face," says Carol Mills, general manager of HP's General Systems Division. The UN SDNP, originally founded in 1992, helps developing countries "get connected." By donating its Internet hardware and software products and lending its support, HP is planning to assist the SDNP in building an online information access and communication network in 16 developing countries.

The UN SDNP has already benefited people in Pakistan where the SDNP handles 2,500 nodes and 5,000 users countrywide in four cities. And in Nicaragua, the SDNP network has helped that country's citizens to update their environmental laws. In all, the SDNP has given the people of 24 developing nations the ability to exchange information amongst themselves and the rest of the world. Interestingly, according to some estimates, "the next billion users on the Internet will come from developing countries," says Rita Hoover, the program manager for HP on this initiative.

If all goes well, Mexico will be one of the next countries to benefit from the HP/SDNP collaboration. Because of

deforestation, Mexico's Patzcuaro Lake is being filled with eroding soil and contaminated with pollution from residual waters lying along its banks.

In short, the ecosystem is out of balance. But the SDNP network will help bring local and other worldwide experts

in academia, government and local industry who can share information on possible approaches that include water treatment, garbage collection, intelligent fishing practices and soil preservation. "From a 'world citizen' perspective, it's an innovative use of informa-

tion that levels the playing field for people that may not have access to certain sources of knowledge," says Mills. "And, they can react as soon as a problem gets identified."

Although its success is far from assured, it's an unprecedented agreement between HP (the first technology vendor to offer such assistance) and the UN SDNP that

will help developing countries receive critical information technology and will increase their access to the Internet for global information sharing on not only environmental protection but an important asset in their economic and social development. "For me, it's not about the technology," stresses Mills. "It's the social impact that comes with the use of the Internet. It's neat."



agement market. Since September, Express Systems' Express Meter 3.5 has been shipping as a WRQ product. With software metering, inventory and distribution functions, Express Meter helps IS managers discover what applications are actually used by desktop users and ensures that legal licenses are not violated. Founded in 1986 by Brain Conte and Paul Davis (former Microsoftians), the privately-held Express Systems (formerly hDC Computer) employing 40 people has been subsumed for an undisclosed sum by the \$111 million WRQ, which is also privately held.

• • • •

Attempting to further its cause in the software management market, WRQ is sponsoring the Software Management Council, an industry forum for customers and partners to discuss emerging software management technologies. A Web site — www.swmc.org — has been created for IS managers to share knowledge and discuss issues pertaining

to metering, inventory and software distribution.

SOFTWARE INDUSTRY ENTOMBED BY ANCIENT ENCRYPTIONS

The Clinton Administration, reversing a 4-year-old export control policy, will now permit U.S. software makers to export 56-bit key length Data Encryption Standard (DES) products during the next years. While that's an improvement over the previous outdated, 40-bit key length standard, American software vendors are still not satisfied. "It's a compromise," said Microsoft Chairman Bill Gates, during his keynote at UNIX Expo in New York City in October, "but it's not enough."

Noting that "it's important to recognize that customers purchasing DES products will require continuing support for those products," an HP press release lauded the Administration's proposed reforms. According to Lew

Platt, HP's chairman, president and CEO, "The modification in export restrictions helps U.S. computer companies to better compete in the world markets and to provide solutions for electronic commerce in the global community." In particular, according to the release, HP welcomed the fact that the jurisdiction for encryption export controls will be transferred from the State Department to the Commerce Department. The step recognizes that encryption products can now be considered in the "battlefield" of the commercial market rather than in military terms.

PROMISES AND LIES FROM THE ANNALS OF DATA WAREHOUSING

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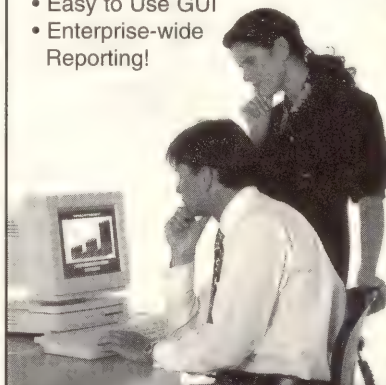
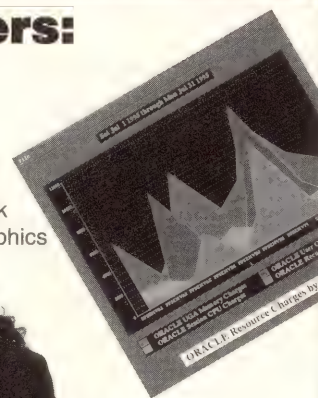
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Institute (DWI) that is the fourth common lie told by consultants, usually representing a small- to medium-sized firm, when the consultant is pitching a \$200,000 to \$1 million enterprise modeling project for a large multidivision company. Apparently, one large insur-

ance company swallowed it hook, line and synergy. After 14 months and more than \$700,000 in consultant fees, they scrapped the entire project. Their five division presidents found they couldn't agree on a common definition of a product. So they agreed to dis-

agree, and built divisional warehouses in which each division could have its own definitions.

IT managers who think that having consultants around will lead to consensus on business definitions like revenue, product, client and other meaningful "business rules" better think again. Data modeling teams don't usually cause a compromise on definitions that are critical to a corporate manager's success. Data modeling can be useful, but data modeling tools will not improve the situation warns the DWI.

Year 2000 Solutions.... for HP 3000 & 9000



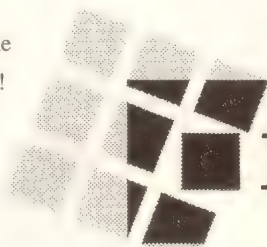
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The complications arising from the Year 2000/ 2 digit year can range from minor "bugs" to complete shutdowns.

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CIRCLE 147 ON READER CARD

GLOBAL AGREEMENTS ON TARGET FOR TARIFFS

The Semiconductor Industry Association (SIA) reported that prospects for completion of a global Information Technology Agreement (ITA) were looking quite good after a new working understanding of tariffs between the United States, Japan and the European Union was reached. The goal is to eventually eliminate tariffs on chips, computers, software, telecommunications equipment and other information technology products. In fact, the United States, Japan, Canada, as well as Korea agreed to eliminate their tariffs on such items. Industry experts estimate that the ITA would save more than \$1 billion per year for the U.S. industry alone.

HP LAUNCHES WITH NASA FOR \$100 MILLION

HP has been awarded NASA's Scientific and Engineering Workstation Procurement (SEWP-II) contracts. As the prime contractor and program manager for both contracts, HP will provide PA-RISC-based workstations, as well as peripherals, software, training and support services for the Mechanical Computer-Aided Design (MCAD Class 2) and Geographic Information Systems (GIS Class 8). The estimated worth of the contracts is \$100 million.

Who or what do you think is worth watching in the industry? Let me know at thompsona@cardinal.com.

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CIRCLE 181 ON READER CARD

LETTERS

A CALL FOR HP-UX ANSWERS

Does anyone know how to create a bootable disk in HP-UX version 6.2?

I have a disk that is dying (I have to open it up and free the heads periodically). I have made copies of the disk on another disk and on tape.

When I tried to boot off the new disk, with the copied files, I get an error about swap files, and the system halts.

Any thoughts (besides upgrading)? Please e-mail me at lewis@instorm.net.

Rick Cressy

Service Manager/Network Administrator
Lewis & Lewis Enterprises

When HP-UX 10.x starts or stops down, it lists several pages of programs it is starting/stopping, giving their status as OK, N/A or FAILED. I had once had xntpd running, but now I don't any more, yet it still tries to stop it on shutdown, giving the message FAIL. Should I remove the K340xntpd script from /sbin/rc1.d, or is something else deciding which scripts to call or which flags to pass the scripts?

Zachary H. Leber

Radiotherapy Development Manager
Radionics/RSA

Fred Mallet responds: It uses X rights to decide which files to execute, so don't remove the file, just:

```
chmod 444 /sbin/rc1.d/K340xntpd
```

Editors note: The information for Scitor Corp. listed in the September issue ("It's In The Mail") was incorrect. The correct information is: Scitor ITS, Atlanta, GA, (770) 612-4700.

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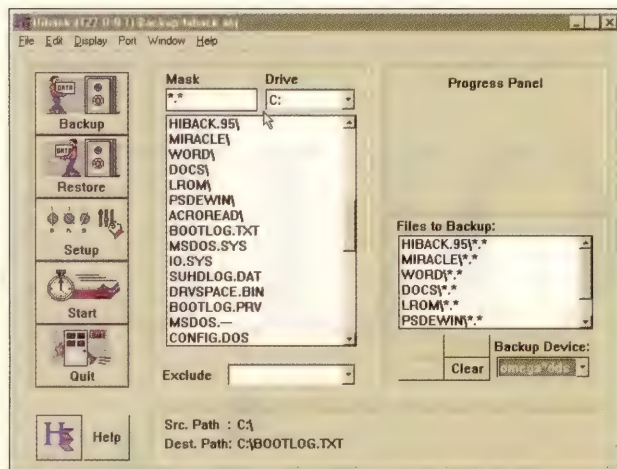
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CIRCLE 351 ON READER CARD

Too many files on your server and not enough storage space to go around? Well, HICOMP America Inc. (Spring, Texas), a division of Hinrichs & Hinrichs GmbH, recently released HIBACK/UNIX and HIBACK/NT, backup engines certified for SAP R/3. According to Denys Beauchemin, HICOMP's general manager for U.S. operations, the program needs no customization. "Just put it in, declare the devices you need to back up and boom, you're done. If the user gets more sophisticated, all they have to do is declare the new devices in the configuration, claims Beauchemin.

The programs support all major UNIX versions, network backup, DOS, OS/2, Windows and Windows NT.

It also writes to tape, QIC, DAT, DLT, Exabyte, optical disc, autoloaders, jukeboxes and STK robot libraries. The Windows NT version uses a GUI, offering users the chance to click on an icon to do the work. All the user has to do is execute and name the directories they want to back up. "With the GUI, it is also easier to do restores as well by bringing directories down to the individual files," Beauchemin explains.

A HIBACK backup of multiple files creates a single file containing all the saved files and has a header label regarding the contents. These files can be appended directly on the backup media to existing "savefiles" created by any operation system version of the program. HIBACK offers unattended backup, which frees up operators for other tasks, and allows unattended disk-to-disk storage if space is available. Once done, the savefile can then be transferred to another device with the HIBACK archive function. Along with software compression, this lets operations continue with minimal downtime. It also achieves unattended backup where no device is accessible.


The application also can store data across a network to remote units. It does this at

high speeds using TCP/IP routines. And, remote store and restore is as simple as using a local backup. With the Windows NT version, TCP/IP is used with WinSock, while the UNIX version running over TCP/IP can be controlled from a Windows client with GUI support. Either way, split backups can be performed among up to eight devices. The Windows NT version can backup a PC to UNIX, MPE or a Windows NT server, and provides incremental or full backup for the PC or Windows NT server. The UNIX version can receive backups from Novell, MS-DOS, Windows, Windows NT, OS/2, MPE and UNIX clients.

Both versions have optional data compression of 2:1 or more depending on the data. HICOMP/UNIX has multiple store modes — filesystem, raw devices and UNIX pipes. It also offers selective automatic exclusion of NFS mounts and CD-ROM mounts.

HIBACK/NT costs \$995 for the server version, while HIBACK/UNIX starts at the same price for small boxes and goes up to \$20,000 for the largest UNIX boxes.

—Steve Berlin,
Contributing Author



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CIRCLE 353 ON READER CARD

In May, Information Technologists Inc. and Information Tools Inc. (collectively known as ITI) changed its name to Actium Corp. Today, the name change reflects Actium's evolution to provide complete "one-stop" client-server solutions under one roof — no matter what systems or platforms a client wants.

According to Carmen Alamenó, director of hardware sales for Actium, one-stop solutions were once available with mainframes, however, there was only one shop to stop at — IBM. "Even the HP 3000 had that type of solution," says Alamenó. "Then, in the 1980s, you have client-server computing where a customer could have to work with up to 20 vendors in order to get their hardware, software, implementation, tools and training. And then there were the consultants." Alamenó maintains that today's users feel the need to one-stop shop to provide for their needs.

"Actium wants to educate the users within the organization, not replace existing infrastructure or people," says Scott G. Silk, vice president of sales and marketing for Actium. "We want to get in and then get out, versus an Andersen Consulting who gets in and stays in."

Since its formal launch in 1989 as ITI, Actium has placed a premium on reading market trends. "Actium monitors 'bleeding edge' technology until it goes mainstream. Then we add the technology, either hardware or software. Such as Lotus Notes," says Silk. For example, Actium has provided an integrated HP/SAP solution, but there is no altering of the original products. Rather, according to Alamenó, they make the integration solution "turnkey."

Actium then "flies in under the radar" into Fortune 1000 companies looking for client-server solutions. The systems integrator will typically go in with a \$100,000 solution. Once they've established they can deliver, the door is open for the \$250,000 solution and "the next thing is, you're in for the million dollar deal," says Silk. "We're not a high-level Big Six company that wine and dine a CEO and then ship in a busload of 21-year-old developers."

Most of Actium's leads come from the larger vendors, HP, IBM or Digital for example. That being the case, they will push the platform from which the lead comes and they "will live or die with that vendor." That loyalty has earned Actium an

impressive list of partners, including: Cognos, HP, Holistic, Informix, Logic Works, Lotus, Microsoft, Novell, Open Environment, Oracle, Powersoft, Rational Software, SQA, Sybase, Compaq, Digital, EMC, IBM, Sun and Tricord.

Actium offers solutions in consulting, hardware, software, implementation and training. The six areas of expertise they strive to excel in are business process analysis, data warehousing, Internet solutions, groupware, object-oriented development and technology architectures.

Actium now has five major offices throughout Northeastern United States employing over 250 people. According to Silk, the company has experienced an annual revenue growth rate of 100 percent per year since 1990.

According to Actium, technology offers the potential of more productive and more profitable business, however it must be put to work to realize its potential. And today's IS managers in a world of multiplatform, heterogeneous environments simply can't do it all on their own.

— Charlie Simpson,
Editor-in-Chief

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IT'S
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DCE

Once You Get Past THE Pain

Although some of the shortcomings of open, client-server architectures can be linked to technological immaturity, today's PC-centric, client-server designers and developers are not quite ready for prime time enterprisewide application development. In the early 1990s, client-server projects were primarily Online Analytical Processing (OLAP)/decision support implementations suited to the business needs of an organization. Today, strategic client-server implementations, which by definition must include a mainframe, according to IBM, or be N-tiered and scalable, according to The Open Group, include more *Online Transaction Processing (OLTP) systems*.

The only answer for such an architecture which must technologically span the enterprise as well as be geographically dispersed is the Open Group's Distributed Computing Environment (DCE). DCE is the only serious effort for truly open, enterprisewide, interoperable, client-server UNIX (HP-UX 10.2, IBM AIX 4.1.4, Sun Solaris 2.5.1 and other DCE-compliant operating systems such as MVS 5.2.2.).

However, as Windows NT systems based on Intel's Pentium Pro gain a stronger foothold as preferred workstations (What happened to the thin client concept?), individuals who were at one time individual PC code-jockeys are being thrown into enterprisewide projects — without the necessary skills for large-scale, enterprisewide development. Consequently, many client-server

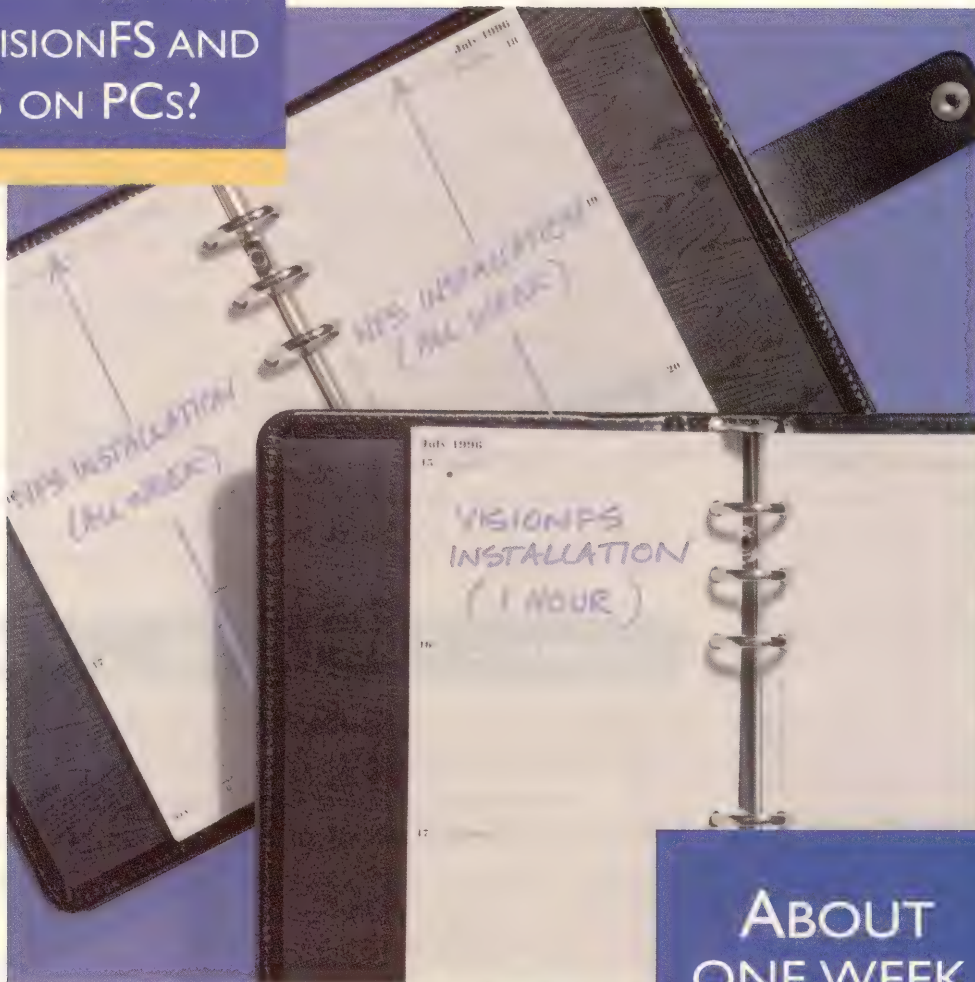
FRANK TETI

professionals have never been involved with a mainframe package installation, such as Integral's (Walnut Creek, Calif.) MVS-based HR system or Dun & Bradstreet Software's (DBS; Atlanta, Ga.) Millennium general ledger system, or custom COBOL implementations in an enterprise.

Outside of the ubiquitous database design tool or pictogram, prototyping and storyboards rule. In these large-scale projects, true integration among individual groups is important. No one actually understands the entire system and therefore full lifecycle planning (in other words, an implementation methodology) becomes a primary focus.

Project methodology — Method 1, Summit, etc. for some Big Six firms, and Catalyst for large consulting firms like Computer Sciences Corp. (CSC;

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CIRCLE 124 ON READER CARD

Berwyn, Pa.) — is a way of life. So for those companies, a good understanding of the methodology is required. In fact, the methodology not only becomes a tool for how to plan, estimate and build the software, but the terminology becomes a lingua franca for communication among the project participants.

CAN'T HACK IT

The problem with client-server professionals is they haven't worked with conventional methodologies and the object-oriented methodologies they may be working with — OMT, Fusion, Shlaer/Mellor, Booch, Martin/Odell, CRC, Wasserman, Wirfs-Brock Responsibility Driven-Design, Objectory — are immature; none has emerged as the clear standard du jour. And that further impedes software developers by not enabling them to lock into a somewhat common nomenclature.

I am sure Ed Yourdon would agree that process modeling and data flow diagramming is not implementation specific, despite the fact that he has now jumped on the object-oriented bandwagon and is trying to distance himself as a legacy methodologist.

Face it — designing open, client-server N-tiered systems takes an understanding of: conventional methodologies, such as module hierarchy, data definition, process logic and end-to-end processing; and an understanding of object design, such as definition of classes and inheritance, object class-to-relational mapping, assignment of operations to classes, definition of operations and message protocols. In object-oriented analysis and design, the primary emphasis is on classes and objects, which is in contrast to structured analysis and design where the primary emphasis is on process-oriented functional decomposition.

During one application re-engineering project, I worked on a team that received a Microsoft Visual Basic application with 30 procedures, but no documentation and no naming standards for variables. And this was the code that would eventually process T&Es for

DCE is the only serious effort for truly open, enterprisewide, interoperable, client-server UNIX.

the entire workforce of a Fortune 500 company. That was the result of a prototype-based methodology where the prototype looked so good that it found its way into production *with all of its shortcomings*.

In fact, with object-based applications like Visual Basic and PowerSoft's PowerBuilder, the scripting language is mixed in with buttons and drop-down list boxes, which are inherited from other windows and sometimes invisible. At a minimum, you should have internally consistent naming conven-

tions for application objects and consider using a third-party object class library when doing custom development. The moral? Structureless GUI code is a lot easier to write than it is to understand and enhance — let alone re-engineer.

YOU KNOW IT DON'T COME EASY

But while monolithic mainframe applications have been replaced by fat

"REVOLUTIONS AREN'T A PICNIC." — ANWAR SADAAT

Project planning and management is not just another software object as Microsoft might have you view it. Project management software and software development methodology is, for most companies, a primary business mission. It appears that the labor force has too many techies and not enough technology-savvy people who want to manage and plan projects. Needless to be say, a software system is more than just code. To succeed in the open, enterprisewide arena, you need to:

- ✓ **Have superior, or at least adequate, resources.**
- ✓ **Organize around eclectic, high performance teams, not just homogeneous disciplines.**
- ✓ **Build team collaboration (it must be designed for and formulated, don't expect it to just happen).**
- ✓ **Practice the deep-lifecycle, fundamentals mantra: scope, business requirements, critical path and requirements-based testing.**
- ✓ **Define the scope, objectives and functional granularity of a prototyping effort as clearly as possible.**
- ✓ **Embrace a methodology. Endemic to methodology-less projects is the dreaded problem of scope creep.**
- ✓ **Understand the complexity or weaknesses in a particular technology.**
- ✓ **Test the design — not the application.**
- ✓ **Face the fact that implementations are hard work.**

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ALL DCE

clients and unwieldy middleware-based applications in a DCE Remote Procedure Call (RPC) environment, you are, in fact, still building your own custom environment. Although DCE cells are still more of a implementable *framework* than a mature, *distributed computing environment*, DCE makes client-server interoperability (somewhat) transparent.

For example, in a DCE/Encina

environment, you cannot completely monitor MVS/DB2 transactions from a UNIX middleware environment without an SNA gateway and TCP/IP-to-LU6.2 conversion. Additionally, the Transaction Processing Performance Council (TPC)-C or -D benchmarks for estimating performance don't exist for this configuration. Therefore, it is hard to get a fix on the resulting throughput without an implementa-

tion. Nevertheless, integrators continue to look for seamless ways to integrate disparate technologies.

Speaking of disparate technologies, despite Microsoft's "enterprising propaganda," Windows NT 3.51 cannot be considered an enterprisewide development environment. In most organizations to date, Windows NT is deployed as a database server. However, as Windows NT scales-up (purportedly with more linear scalability on systems with eight or more processors) and if Microsoft's Distributed Component Object Model (DCOM) is found to be reliable and secure enough for enterprisewide computing, it becomes a serious threat to DCE. If Novell's Green River doesn't live up to its potential, Windows NT may become the corporate network technology.

Yet, it's interesting to note that if DCE does become the de facto open system, client-server environment, IBM, who has not necessarily been a major client-server contender, will emerge as having some of the fundamental open system infrastructure tools: Tivoli (system management) and Transarc's Encina (transaction processing). HP users should note that DCE uses HP's Remote Procedure Call and Authentication services. And Digital isn't left out either, the DCE Cell Directory Services are based on Digital's Resource Location Services.

For systems professionals, the days of knowing how to use only but a handful of development tools are over. In marketing departments, working groups can be formed around an industry segment, rather than a product. For IT organizations, a similar structure — a matrix organization — must be adopted.

Although it runs counter to the IT ideas of ownership, matrix arrangements are becoming popular as organizations move relentlessly to outside consultants. The consulting firms, on the other hand, seem to be grappling with vertical or horizontal structures based on target industries and technologies. The matrix is kind of a industrial engineering-like view of business: if you set up the right structure and

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TEST NOT, WANT NOT

Automated testing tools are to the 1990s what 4GLs were to the 1980s. Every software development organization seems to have one or two, but they aren't used often enough. In most organizations, a test strategy or plan develops the way the software develops — with a loose coupling between the design deliverables and the system. During a preliminary QA/testing meeting, my team presented a solid functional design document which included business requirements, data flow diagrams, detailed data flows down to the physical element level and product story boards.

The group was obsessed with obtaining the software to test it. Although a test strategy was mentioned, there really wasn't any underlying testing methodology. The technology might change, but a fundamental testing practice dictates

that test plans and scripts should be driven by the business requirements. In fact, this activity should take place well in advance of any software delivery.

Testing, whether automated or not, requires a serious commitment from the executive level; yet it always gets a low priority in the lifecycle of a project. But the bottom line remains: you can't test quality into a software application. *It must be built-in.* But a perceived solid, foolproof design alone does not assure software quality. A logical testing methodology, in conjunction with automated testing tools can improve software quality and increase the probability that the system will be accepted by the user community. So, the next time you're at a meeting with QA or software testers, drop the name of Glenford Myers who is to software testing (*The Art of Software Testing*, 1979) what Ed Yourdon is to software process modeling.

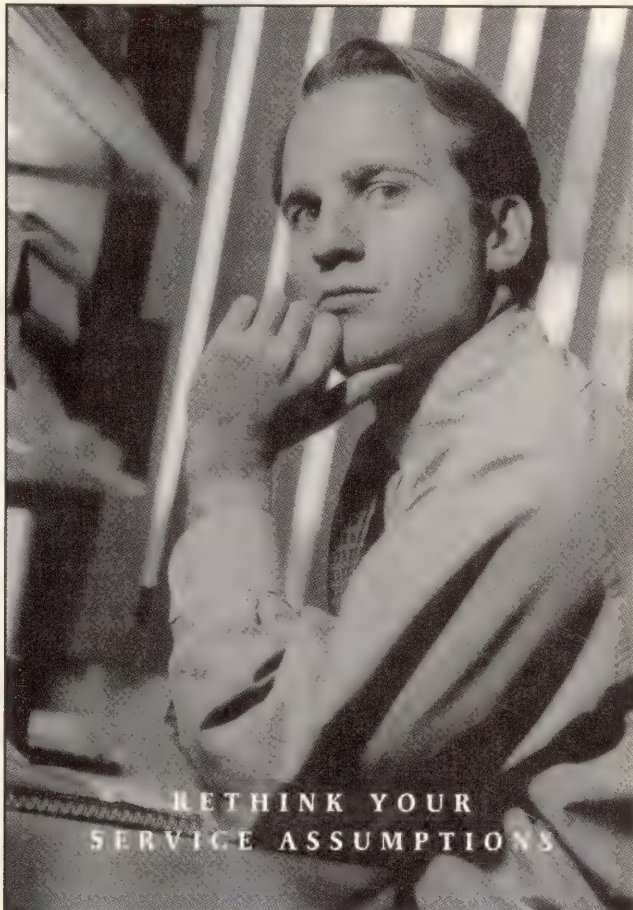
process, the resources in place are not an important success factor.

By the Software Engineering Institute's (SEI) Capability Maturity Model standards, it's probably the only way to operate. Although, at that level, it is assuming that the managing

resources are adept in a number of key IT management and design disciplines and there is a solid IT infrastructure in place. For the typical organization, this is a big assumption. As a matter of course, we must be eclectic and flexible to survive.

— Frank Teti is a technical architect and senior consultant with the Consulting and Systems Integration division at Computer Science Corp. (Berwyn, Pa.). He can be reached at fteti@cscmail.csc.com.

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TPC Benchmark

Evidence Mounts To Support The Distributed Computing Environment

Jon William Toigo

a

dvocates of distributed computing have traditionally labored under the burden of limited evidence to support their business case. Until now, proposals for new information processing solutions based on the Distributed Computing Environment (DCE) relied mainly upon storytelling about the experience of other companies whose unique hardware and software configurations made comparisons dubious. By comparison, vendors of centralized data processing and traditional network platforms had far more hard data and statistics to promote their solutions than did DCE advocates.

There are indications, however, that the burden of proof may be easing for DCE vendors. In an announcement made by HP and Transarc Corp. (Pittsburgh, Pa.) at the DECORUM '96 conference in Tarpon Springs, Fla., the first audited performance benchmarks for Encina/9000 and DCE/9000 were presented. Adhering to a benchmarking standard set forth by the Transaction Processing Performance Council (TPC; San Jose, Calif.), HP tested a configuration that included Transarc's Encina transaction processing monitor tuned for optimum performance on HP 9000 servers to produce a documented 4886.07 transactions per minute at a cost of \$260/tpmC.

The results of the benchmark test were important. HP emulated 4,300 user terminals hammering an Oracle server with nearly 5,000 transactions per minute to demonstrate the solvency of its Encina/9000 DCE solution. The performance of

the test platform raised the bar set by HP customers who have fielded comparable distributed configurations.

For example, Telstra, the Australian telecommunications company, uses an HP DCE/9000 and Encina/9000 solution that handles 1,500 users, and 10,000 to 15,000 Encina service requests per hour with a typical server response time of .01 to 1 second. A similar solution implemented by Tokio Marine and Fire Insurance in Kobe, Japan, which supports up to 4,000 clients, reportedly improved response times over the company's older, centralized architecture by 2.5 times.

With the TPC test results, HP has more than the apocryphal evidence of its current customer accounts to offer companies considering DCE. Thanks to the TPC, they have a solid performance benchmark upon which to base claims about the integrity of their DCE platforms.

ABOUT TPC

TPC is made up of 40 members worldwide, ranging from system and software database vendors to market research firms and end user organizations, including the Australian Government. The organization was founded to provide a means for benchmarking the performance of distributing computing architectures and databases.

To date, four benchmarks — labeled simply TPC-A through TPC-D — have been issued by the organization. TPC-A, issued in November 1989, measured performance in update-intensive database environments typical in online transaction processing (OLTP) applications. The benchmark measured how many transactions per second a system could perform when driven from multiple terminals. Throughput data was collected as transactions per second (tps) with performance described as local throughput for LAN configurations and wide throughput for WAN configurations. Each company using the benchmark was required to disclose the

details of the benchmark run, their system configuration and its cost, including five year's maintenance costs.

TPC-B, approved in August 1990, was a database stress test rather than an OLTP benchmark. On its heels, in July 1992, TPC returned its focus to OLTP with the TPC-C benchmark. More complex than TPC-A, benchmark C involved a mix of five concurrent transactions of different types and complexity executed either online or in deferred queue. This

test simulated the activity of an order entry environment. Transactions included the entering and delivering of orders, the recording of payments, checking of order status and monitoring the level of stock in warehouses.

As illustrated in the HP test, the results of the test were expressed as a metric — tpm/C. HP and the many other companies that implemented this benchmark, including Sun Microsystems, IBM, NCR, Bull, Digital and Compaq, reported their results as the number of transactions fully processed per minute (tpmC) as well as total system cost, including the cost for hardware and software, five year's maintenance, and sufficient storage capacity to hold the data generated over a period of 180 eight-hour days of operation divided by the number of transactions per minute (\$/tmpC). In this way, the benchmark provided businesses with "a more extensive, more complex yardstick for measuring OLTP performance."

New benchmarks have been announced or proposed to facilitate the measurement of the performance of decision support systems (TPC-D), the capability of systems to support the computing environment appropriate to a large business enterprise (TPC-E), and the performance and price characteristics of client-server solutions for OLTP (TPC-CS). TPC articulates benchmark testing standards, reviews testing conducted by product vendors, and certifies the results of tests.

Compliance with TPC standards

during testing is guaranteed by audits conducted by TPC-certified consultants and also by the membership itself. Many members are competitors in the marketplace and scrutinize each other's testing practices to prevent unscrupulous vendors from obtaining unfair market advantage.

According to the organization, any company is free to implement and publicize a TPC result, provided that the test results are properly audited and certified. Detailed specifications for benchmarks are available

from the TPC Administrator's Office, or on the Internet at www.tpc.org. Companies will need to learn the format for a full disclosure report, the rules for report submission, and the name and schedule availability for a TPC auditor.

A NEW YARDSTICK

The efforts of the TPC are producing tangible results. Not only are the performance measurements gleaned from supervised benchmark tests informative to prospective technology end users, they also provide clear, apple-to-apple comparisons between distributed and centralized OLTP solutions. The tests must be replicable and must be conducted to strict standards of real-world systems implementation.

These requirements ensure that a stripped-down, souped-up platform is not used to skew results. In the words of one anonymous bystander at the DECORUM Conference, "My car could run at 200 miles per hour if I stripped out the safety and comfort features — like brakes, a back seat, etc. But I wouldn't want to drive it."

— Jon William Toigo is an independent writer and consultant specializing in business automation solutions. He can be reached at jtoigo@intnet.net or www.intnet.net/public/dolphin

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FMS II also helps managers improve productivity and control costs. Erie County, Pennsylvania cut their auditing costs in half by having outside auditors use Inquiry Plus. This ad hoc reporting and analysis tool provides fast access to a wealth of information. Inquiry Plus allows users to drill down from summarized data to detail accounts and even to supporting documents in other systems such as Accounts Payable or Accounts Receivable.

Inquiry Plus and the many FMS II productivity tools utilize an intuitive Windows graphical interface. Users can take full advantage of customizable screens, menus, toolbars and online help. As well, managers can employ FMS II's robust, PC-based decision support tools for analyzing data from FMS II as well as data from third party systems. Mark Murphy of Ames Laboratory puts it this way, "Users have found it easy to acquire and retain the skills needed...the users feel much more at home with FMS II."

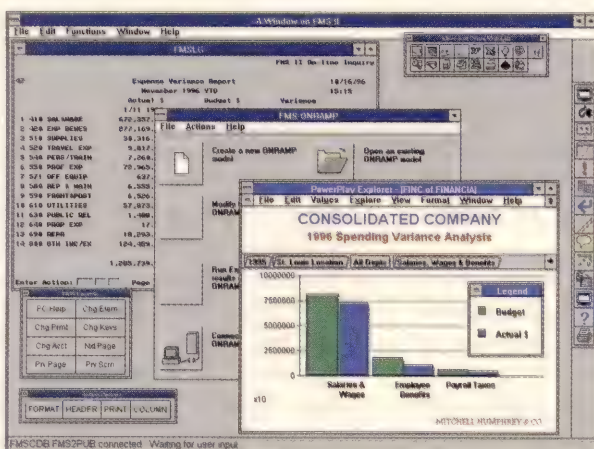
Powerful reporting, advanced technology and minimal operational intervention are among the FMS II's benefits acclaimed by IS management. Douglas Place of Hitchiner Manufacturing

made this observation, "FMS II met my main objectives for a new system — complete integration, ease-of-navigation and the capability to run reports and access data without needing to bog down MIS with requests." And Sherry Fark of General Tire commented, "We wanted to move to the next generation client/server application while on the HP 3000. FMS II allowed us to take this step forward."

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The Drive for TAPE SOLUTIONS

On average, most enterprises find their data storage requirements growing more than 30 percent a year. New image, text and graphics applications produce data at a phenomenal rate, requiring higher-speed operations and putting strains on data acquisition, transfer and retrieval capabilities — and the storage subsystems themselves. Plus, business re-engineering and restructuring is overlapping with the need and development of applications like data warehousing and data mining.

As information becomes more and more the core of business, safeguards against failures or accidental losses take on new urgency: lose your data, lose your business. This is driving the development and enhancement of storage technologies, as is the pressure of worldwide business, which, in effect, never shuts down. Add to this the reality of CPU speeds increasing 100 percent per year and storage disk speed increases averaging a comparatively inadequate 10 percent per year — and the issues of capacity, growth, performance and backup speed take shape even more clearly. Are today's data storage technologies evolving fast enough to handle 21st century demands?

Performance Trails Capacity

Current magnetic disk technology is light-years away from its early days, when bottlenecks were the norm as users moved large volumes of data to

storage devices. Today's controllers improve the speed to magnetic disks, and RAID technology provides high data availability. Disk manufacturers continue to push the magnetic disk technology envelope, dramatically increasing capacity (100 percent in 18 months) and performance in smaller form factors, while reducing the effective cost per megabyte. Recently announced 9 GB disks are selling for less than 25 cents per megabyte — with sustained rates up to 9 MBps.

Higher speed buses will help storage keep up with processors, better matching storage performance to CPU performance. The Ultra SCSI technology, at 40 MBps, is being introduced now, and in the near future other high-speed conventions will appear. In particular, watch for Fibre Channel Arbitrated Loop (FC-AL) technology, with high

speeds of 100 MBps and full duplex speed of 200 MBps. FC-AL will have up to 126 nodes for connecting storage controllers or devices, compared to SCSI's eight- and Ultra SCSI's 16-node connectability.

In specific niches, Solid State Disks (SSD) are highly suited to mission-critical applications and supporting high-performance applications in concert with magnetic disks. Providing self-backup even in a power failure, and comprised of DRAM, a small magnetic disk and battery, SSDs also use Error Correction Code (ECC) to provide very fast and reliable storage. As elec-



tronic data devices, SSDs eliminate time delays associated with seek and latency inherent in rotating magnetic disks, enabling up to 30X faster access times.

SSDs are reputedly expensive, but cost erosion of their commodity components is reducing their price. Nevertheless, SSDs cost significantly more than magnetic disks. Because SSDs are traditionally used for frequently accessed files — which usually represent 1 percent to 3 percent of online data — savvy users match SSD

(Continued on page 34)

JOHN G. CELI

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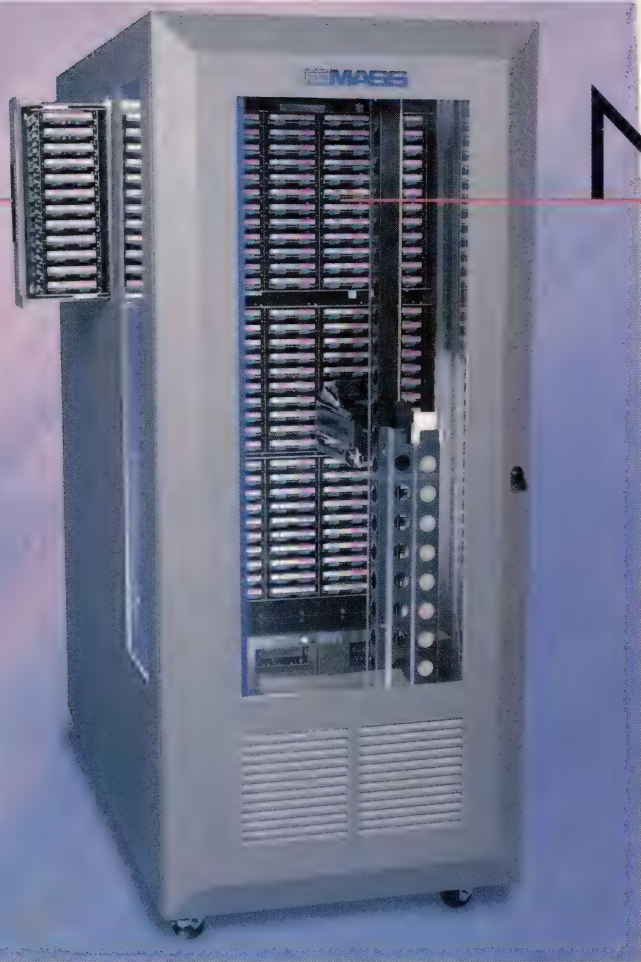
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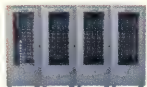
	Maximum Cartridges	Uncompressed Capacity with DLT	Maximum Drives	Aggregate Data Throughput with 8590
Add One Expansion Module	368	12.9 TB	8	72 MB/sec



	Maximum Cartridges	Uncompressed Capacity with DLT	Maximum Drives	Aggregate Data Throughput with 8590
Add Two Expansion Modules	578	20.3 TB	12	108 MB/sec



	Maximum Cartridges	Uncompressed Capacity with DLT	Maximum Drives	Aggregate Data Throughput with 8590
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DISC	Plasmon	DTF
Hewlett Packard	Sony	VHS
IBM	StorageTek	3590
	others	others

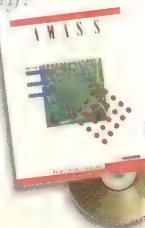
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technology to the right application — for example, time-dependent, mission-critical or fiscally mandated financial applications, or even Internet servers. Therefore, the cost is justified and has rapid pay-back while providing competitive advantages.

Digital Linear Tape Technology

Despite technological progress, tape remains the backup technology of choice, with established presence, high capacity, high performance and low cost driving its wide acceptance. It is easy to use at the low end of the market, and new, automated tape libraries are becoming a necessity at higher market levels.

One tape technology stands out as the most effective for meeting demands for cost effectiveness, higher capacity and performance, and high-speed backup operations: Digital Linear Tape (DLT). In the past two years, the volume of the DLT drive market has tripled. Here's why:

As an ANSI industry standard considered to be "open," the stationary DLT drive head records data with the tape media streaming at 100 to 150 inches per second. Because it does not use a rotating drum head, DLT achieves higher reliability of the drive head (10K to 30K hours per 100 percent duty cycle) and of the media (1 million media passes). The data transfer rate is 1.5 MBps (native) and 3 MBps (compressed) in a 5.25-inch form factor. The media capacity is 20 MB (40 MB compressed).

DLT's high capacity and performance are attractive to midrange and client-server applications used to backup servers, midrange systems and networks. DLT is also found in some LAN applications, especially where performance increases are expected.

In its next version, now available for evaluation, the native speed will be 5 MBps, with native capacity of 35 GB. This version is anticipated to compete

successfully in the UNIX market with 8mm, 4mm DAT and other technologies. These include the 8mm market leader, Exabyte, who is now shipping their new version, Mammoth (20 GB capacity and 3 MBps transfer rate), and Sony, who will be shipping a new 3.5-inch form factor AIT tape drive with 25 GB capacity and 3 MBps transfer rate.

The 4mm DAT, an established leader in the workstation and server market with a large and growing customer base, will also move to a higher capacity (12/24 GB) and higher speed (1 MBps) model soon — the DDS3. And QIC, a long time favorite vendor in the PC and PC/LAN markets, is being developed in different variants to address the needs of these rapidly growing and diverse markets.

DLT Libraries

Nowhere is the success of DLT more visible than in the automated tape

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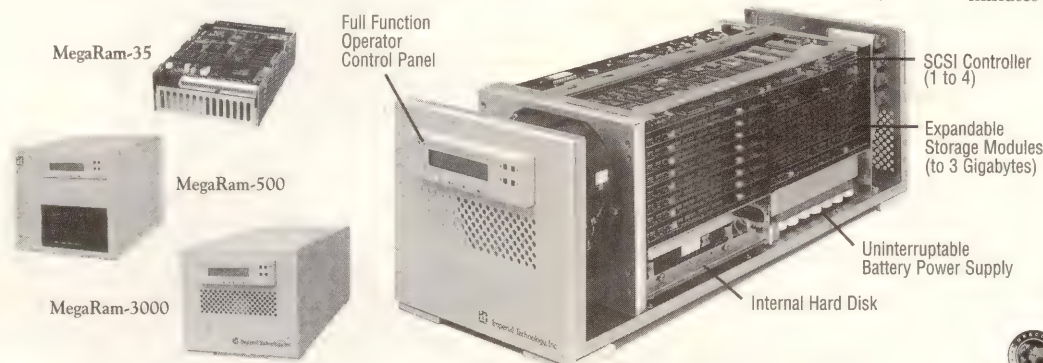
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CIRCLE 142 ON READER CARD

library market. Automated tape libraries, with appropriate software, have been developed to better manage and store data and to be suitable for near-line applications. They store high volumes of data at a low megabyte cost (2 cents per megabyte).

Besides providing a "lights out" operation, automated tape libraries provide needed flexibility in managing storage on the network. By using robotics and bar code readers, they reduce operational costs, maintenance costs and human error. As a near-line storage technology, automated tape libraries are important to data backup and restoration, archiving and imaging applications, and in HSM environments, among others.

Current magnetic disk technology is light-years away from its early days, when bottlenecks were the norm as users moved large volumes of data to storage devices.

Available in a range of configurations, automated tape libraries allow users to best match hardware and software products to their requirements. Many use multiple tape drives and a large number of tape cartridges, and provide expandability with cartridge pass-through between libraries. These scalable library systems can accommodate users' needs as operational demands change and grow.

Today, most major system suppliers and storage manufacturers are offering DLT loaders (mini-libraries) and scalable automated tape libraries for applications from the client-server to the mainframe. Some of these libraries operated in mixed mode, allowing users to continue using their past tape technologies in combination with DLT, or organize the conversion of data in past

file formats to the DLT ANSI standard.

Mini-libraries are available in a range of storage capacities, typically starting at 200 GB; automated tape libraries start at about 1 TB and surpass 10 TB. These tape libraries can be connected with cartridge pass-through capability to mix and match cartridge-to-drive ratios for the needs of a particular data center. DLT library footprints are small, enabling 10 GB capacity in less than one square meter.

The View On Optical Technology

Optical storage variants are making inroads as backup for some specific applications and workstations. In the long term, they will share the backup task with tape. Optical is considered a reliable and long-life technology. Non-contact and durable, optical platters are easy to handle and store, and are most amenable to robotic implementations such as jukeboxes.

Specifically designed to hold archival data that cannot be altered — Write Once, Read Many (WORM) — optical technology is indeed unique; it is the only technology that meets specific government and industry standards for archival purposes.

For these reasons, manufacturers are investing in optical technologies for future high-density data storage.

■ Magneto-Optical (MO) technology produces WORM or Read/Write platters using the same multifunction drive.

■ CD-ROM (WORM) technology has experienced phenomenal growth, especially in software distribution and publication markets. Originally addressing niche markets, CD-ROM now has achieved an important foothold in the general market, providing leverage for compatible follow-on products. CD-R (Recordable) technology is projected to grow dramatically over the next few years — as will the less mature CD-E (Erasable) technology — specifically in the market's low end (on workstations) and in LANs.

■ Following CD-R/CD-E will be digital video disk (DVD) technology, which will enable large capacity storage.

Optical disks and jukeboxes have been useful for HSM applications, and for storing files requiring the archival format of WORM. HSM, although used effectively in mainframe and, in theory, midrange and client-server computing, has not reached the level of its high expectations. But, in the long term, HSM may help effectively manage storage, and ease the way for system managers to break their habits of adding more magnetic disks.

Optical technology has been squeezed by factors in the higher and lower ends of the market: rapid price erosion of magnetic disks from above, and the very low price of tape drives and media. This is about to change with the 4X speed MO technology, which offers up to 2.6 GB per platter; data transfer speed of 3.4 MBps for reads; 1.7 MBps for writes; and availability at about 10 cents per megabyte in a high capacity jukebox, where efficiency of high platter-to-drive ratios prevail.

Environment Determines Storage

Ultimately, like most technologies, it will be your business needs that dictate the capabilities of your computing and storage environments. High performance requirements — for accessing, manipulating, retrieving and backing-up data — must be resolved by both processor and storage hardware and supporting software.

Tape solutions hold the best promise for efficient and reliable storage strategies in the 21st century. In particular, DLT libraries are most ideally suited to meeting the challenges of storage management, data backup and near-line storage applications.

About the author: — John G. Celi is Technology Marketing Manager at Digital Equipment Corp. He is responsible for marketing Digital's storage technology products including tape, optical and disk.

FRIENDLY CD-R's:

AT LAST, CD
POWER IS EASY TO RECORD.

Compact Disk Recordable (CD-R) media has evolved from an engineering intensive storage media to one that is more user friendly. Play-only CD's have found their way into all consumer channels, and that appears to be the future for writable CD's.

Today, CD-R has numerous advantages over other storage media, including the much hyped arrival of Digital Video Disks (DVD). It is very inexpensive, costing less

than a penny per megabyte verses an average of twenty cents per megabyte for a Zip Drive™. Blank disks have dropped in cost from forty dollars apiece in 1990 to around six dollars apiece now. CD-Recorders have

dropped to under \$500 and, thanks to advancements in software, are easier to use. CD media has proven itself as very durable, withstanding mishandling better than any other affordable media. It is an optical media, making it tolerant of magnetics, heat and humidity, surpassing yesterday's floppy disc.

CD-R brings additional versatility to the business markets as it allows for cross platform communication, conforming to ISO 9660 standards. When using the correct software, a CD can be utilized on PC,

UNIX or Mac. It can store upto 650 megabytes of information; as a comparison, the information on one CD would take 48 hours to download via the Internet on the average 14.4 modem. This creates a world of applications for file intensive businesses in medical, graphical, legal and other industries. It supports small businesses through its inexpensive

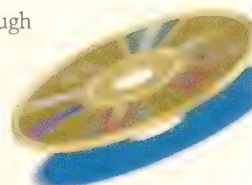
format and large businesses through sheer volume.

Mass marketing of CD-R technology has its challenges, however. In a recent Salt Lake City Tribune® interview, CD-R expert Katherine Cochrane commented:

The fact that CD-R is a complex technology...has come as a shock to some users. It is necessary to set up the computer system that controls the recorder to meet these requirements and many users have had difficulty in doing this. CD-R software uses low-level programming to control the bus interface and the recorder and other processes running on the platform (simultaneously) can interfere, resulting in unreliable recording...or even the ability to record at all. A recording system also has minimum performance requirements in throughput speeds and system memory. However, careful users...have been very successful in implementing the technology, so it's not impossible.

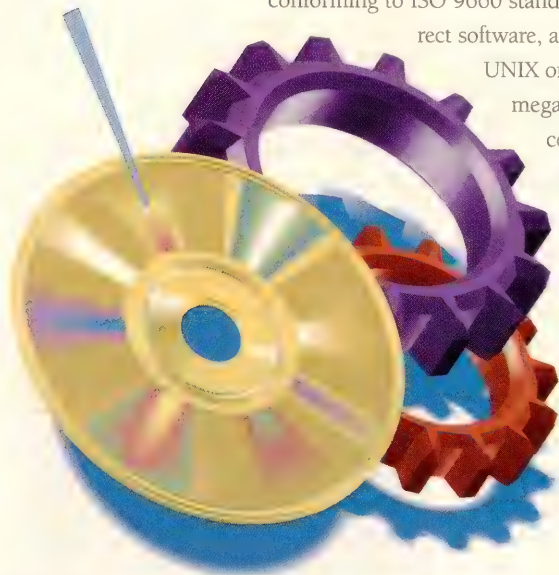
Making it all possible is a company called Elektrosön™. Elektrosön is the world's first company to develop Virtual CD Mastering™, CD simulation and pre-mastering tools for the industry. They are also the world leader in CD-R software. Their latest line of CD-R products, GEAR™ and GEAR.wrks™ are the world's most popular CD-R software programs. The company has even introduced an Internet product, Web Grabber™, to pull information off the Internet and onto CDs.

Ease of use is the core of their designs along with affordability, multiple language support (German, French, Spanish and English) and true cross platform communication. It is Elektrosön's mission to empower users across multiple platforms with the most powerful, cost-effective solution to create, publish and store all types of data.



THE FACT THAT CD-R IS
A COMPLEX TECHNOLOGY...
HAS COME AS A SHOCK
TO SOME USERS.

-CD-R EXPERT
KATHERINE COCHRANE



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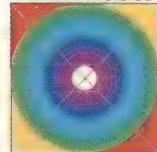
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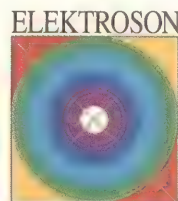
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CIRCLE 212 ON READER CARD

DLT LIBRARIES STORM THE HP WORLD

ATL's IntelliGrip Precision Cartridge Handling System Delivers the High Data Accessibility HP System Administrators Demand



ATL 7100 Series DLT libraries with IntelliGrip Inside support up to 7 DLT7000 drives and 100 DLT7000 cartridges.

Ask any system administrator what his primary responsibility is and he will say, "Keeping the system available."



NEED FOR HIGHER DUTY CYCLES, SPEED & CAPACITY

For HP workstations and small work groups, 4mm tape technology is an excellent solution for light duty-cycle backup. In the enterprise where large network servers reside, expensive 3490 tape drives and libraries are widely deployed. Bridging this gap is Digital Linear Tape (DLT™) technology from Quantum. Originally developed by Digital Equipment Corporation, DLT technology has a well earned reputation for reliably and cost effectively delivering high-end speed and capacity under a heavy duty-cycle. As a result, DLT is the fastest growing tape technology for midrange HP servers and LANs.

THE WORLD'S FIRST DLT LIBRARY

A designer and manufacturer of tape drives, Digital partnered with ATL Products, Inc. to co-develop the worlds first automated DLT library. Knowing the libraries would be the foundation of "lights-out" backup and archival systems, the companies set out to build library robotics that could load and unload literally millions of tape cartridges without service or operator intervention. Early in the project, the designers identified the key to achieving their goal would be a high degree of precision to eliminate tape jams and wear. The result is ATL's IntelliGrip™ precision cartridge handling system.

2,000,000 SWAPS & STILL COUNTING

From its roots inventing and building products for space exploration like the Galileo Recorder, ATL designed the IntelliGrip system to run unattended for years on end. Mean Swaps Between Failure (MSBF) is the key measurement of this ability and ATL is the only DLT library manufacturer with a field proven MSBF of over 2,000,000 swaps - and still counting. The IntelliGrip features that make this possible are:

- 1) An Intelligent Gripper that firmly grips cartridges, but gently picks and places them into the DLT drives. ATL uniquely eliminates the accumulation of dust caused by the wear of cartridges across guide plates or other mechanisms needed to funnel cartridges into drives.
- 2) A Unibody Welded Frame to prevent misalignment caused by shock and vibration. Unlike frames held together by screws and rivets are subject to chronic misalignment.
- 3) Automatic Alignment just in case the library is somehow mis-aligned due to being moved or upgraded with a new tape drive. With IntelliGrip, the library automatically aligns the gripper with cartridge bins, tape drives and load ports.
- 4) ATL-specified DLT drives with firmware and mechanical enhancements for library environments. The result is ATL-specified drives outperform the manufacturers rating for reliability by a factor of three.

ATL 7100 SERIES WITH INTELLIGRIP INSIDE

Designed for high data accessibility, ATL 7100 Series DLT libraries support up to seven DLT7000 drives and 100 cartridges for a native, uncompressed, capacity of 3.5 terabytes, and an aggregate throughput of 126 gigabytes per hour. With 2:1 compression, the ATL 7100 Series libraries are capable of delivering up to 7 terabytes of capacity and a throughput of up to 252 gigabytes per hour.

VISIT ATL PRODUCTS, INC.

Log on to the Internet at www.jpl.nasa.gov/galileo to see images of The Great Red Spot of Jupiter made possible by the Galileo Recorder. Log on to www.atlp.com to see images of automated DLT libraries from ATL.

— Chet Baffa, Vice President of Sales & Marketing

ATL Products, Inc.

1515 S. Manchester Ave.
Anaheim, CA, 92802-2907
Phone: 800-677-6268
Fax: 714-780-7795

CIRCLE 134 ON READER CARD



DON'T GET CAUGHT WITH THE WRONG TAPE LIBRARY.

Especially since your company's business-critical data requires a serious, failsafe storage solution. A solution that can meet your needs today and tomorrow. That's why you should select a DLT automated tape library from the company that invented DLT automation over 4 years ago - the DLT automation leader - ATL Products.

ATL offers a broad range of field expandable models to choose from, with capacities ranging from 560 GB to over 9 TB, and library throughput speeds up to 162 GB per hour, it's easy to find just the right solution to meet your strenuous storage and user demands today, as well as tomorrow.

Another reason to trust ATL is its years of successfully meeting the DLT automated tape library needs of the midrange UNIX world. That's why, for its HP9000 server family backup system of choice, HP selected ATL Products as its exclusive DLT automated tape library reference partner.

So, when selecting a DLT automated tape library solution for your company, don't get caught with the wrong solution - choose experience, choose reliability, choose the recognized leader, choose ATL Products. Call now for more information about our complete line of DLT libraries and the name of an authorized reseller near you.



DLT Automation Experience Counts

Reliability and data availability are the two most important factors when rating an automation system. ATL Products' years of automation experience has produced the Integrated Library system,



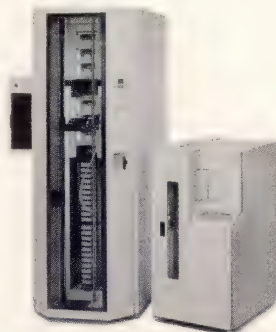
which combines features like the IntelliGrip cartridge handling system and ATL specified DLT drives, resulting in the industry leader in reliability and data availability. DLT experience counts!


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StorageWorks DLT subsystems save you time, too, with sophisticated error correction and read-while-writing cache, to deliver blistering record speeds. You'll complete your backup chores in a fraction of the time—even *unattended*,

if you choose a five or seven tape loader.

And while we're on the subject of saving, your users will think you're a lifesaver when your StorageWorks DLT subsystem begins restoring a trashed file or drive in as little as 90 seconds.

And oh, did we mention the savings you'll get thanks to the new, low prices that make these industry-leading DLT systems more affordable than ever?

StorageWorks is Digital's high-performance, high-reliability family of modular RAID, disk, tape, and optical storage subsystems. Designed as

scalable storage solutions for today's multivendor PC and UNIX networks, StorageWorks sub-systems cover you from desktop to datacenter.

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CIRCLE 261 ON READER CARD

A CASE OF STORAGE:

A New

Lease On

OPTICAL SOLUTIONS

When President Ulysses S. Grant set aside lands including a portion of the Tahquitz Canyon in Palm Springs, Calif., for the Agua Caliente Indian Reservation in 1876, little did anyone realize that the land would one day be worth \$77 million. In 1995, the Bureau of Indian Affairs (BIA), which was responsible for administering a land leasing program as a means of making money from the land, found that the Agua Caliente Band of Cahuilla Indians were swimming in paper as a result.

Paper deeds, parcel and lease records dating back to 1957 which were used as the fundamental means for managing the \$12 million in leasing deals were degrading with age and handling. New commercial leasing activities that also depended upon the documents for reference were on the rise, and the need to easily refer to them grew as much as the need to simply preserve them.

"We had these huge paper files of aging lease records, most of them more than 40 years old, that were filling our offices and becoming unreadable," says Ollie Beyal, tribal operations specialist. "The Agua Caliente tribe relies on the leases as a primary source of income, so it became critical for us to find a solution that would allow us to preserve and manage the records effectively." With more

than 1.3 million pieces of paper to manage, this was no trivial task. So the BIA turned to systems integrator Hershey Technologies (La Jolla, Calif.) to come up with a Novell NetWare-based local-area PC network solution. The BIA then presented the Agua Caliente tribe with Hershey's proposal to purchase an optical jukebox-based image-processing system.

The configuration allowed the tribe to scan in the paper records, so they could be stored and retrieved from PCs on the existing LAN — as document image files. Hershey's solution was built around two extended-storage products from Hewlett-Packard: an HP 120T optical disk jukebox, and an HP SureStore Tape 6000 drive for backup storage. Keyfile's document management software was chosen along with a pair of scanners, one duplex and one flatbed. The tribe approved of the proposal, and BIA went to work with Hershey to solve the problem.

The HP 120T optical jukebox serves as the image repository for the million-plus paper records. The multifunction rewritable/write-once optical disks have a 100-year shelf life. A major requirement for the tribe's goal of preserving the records for continuous use (the bulk of the leases expire in 99 years). The rewritability of the disks allows certain lease records to be updated as lease conditions change, and the write-once, read-many (WORM) capability allows records to be perma-



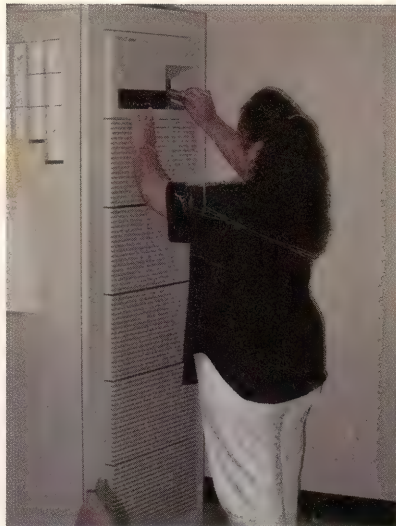
The Agua Caliente Band of Cahuilla Indians were swimming in a 40-year-old sea of documents that were degrading with age and handling.

PAM INGMIRE

nently recorded on disk for archival purposes.

Please Re-Lease Me

Relative to text data files created by word processing applications, document image files consume large amounts of storage capacity. The HP 120T jukebox stores up to 114 GB of data stacked in cartridges accessed by a robotic picker, giving the BIA ample room to store the 1 million plus and growing number of lease record documents. The random-access capability of the jukebox's 5.25-inch multifunction drives, the 88 1.3 GB disk cartridges and the leading-edge cartridge-handling robotics combine to provide BIA with a document image storage solution that's an order of magnitude less expensive than magnetic disk-based storage, yet provides more capacity in a smaller footprint (just six square feet) than an equivalent-capacity magnetic drive unit. Keyfile's document imaging management software rounded out the solution to fit the BIA's LAN.



The HP 120T jukebox, with robotic picker, provides the BIA the means to store the one million and growing lease record documents.

Since February 1996, the BIA has been scanning the lease records into the system and storing them in the HP jukebox. "The system will not only save headaches for the people responsible for keeping each of the leases in compli-

ance," according to Beyer. "But it will save the BIA about \$150,000 a year in man-hours spent managing the mountains of paper. In light of recent budget cutbacks, we really needed something to offset our loss. We're already 30 to 40 percent more efficient in our records-handling capability overall, and we now plan to be fully automated in our leasing management processes by 2002."

By the middle of June 1996, more than 110,000 documents were scanned into the new optical disk jukebox. The number of people in the BIA's lease compliance department was slashed from seven to three due to budget cutbacks, but the HP 120T jukebox system is bringing productivity back up to about twice what it formerly took the seven people to do," says Beyer. We will be able to realize our full profit potential on the land since our leases can now be kept track of more effectively."

— Pam Ingmire is market development manager for the Storage Systems Division of Hewlett-Packard.

HP-UX 10



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IMAGING MARKETS MOVE TO CD-RECORDABLE

Electronic imaging technology addresses the needs of information-intensive industries by dramatically reducing the amount of physical storage space required while simultaneously increasing access to the stored information. Whether your organization is a bank handling millions of checks a year, a medical facility utilizing diagnostic imaging systems, an engineering firm managing a major design project, or any other data-centric operation, electronic imaging can reduce data storage and management costs while increasing access to these increasingly valuable corporate resources.

Compact Disc-Recordable (CD-R) technology is quickly becoming the data storage and distribution medium of choice for electronic imaging applications, due to its unique combination of features and capabilities. CD-R is based on the same technology as CD-ROM and CD Digital Audio, offering a compact, reliable, very low-cost, random-access medium which can hold 650 MB of data on a single disc. Once recorded, CD-R discs cannot be erased or overwritten, protecting your valuable data from accidental loss or intentional corruption. Yet because they are highly standardized, these discs can be read back in any of the 50 million CD-ROM drives currently installed.

For high-capacity, networked data storage applications, CD jukeboxes holding up to 1500 discs, with capacities of nearly a terabyte in a single enclosure, are available. By integrating CD-R drives into these jukeboxes, fully automated, very high capacity, data storage and retrieval systems can be configured.

For data distribution applications, high-speed CD-R drives can be configured with automatic disc loaders and in-line disc label printers, enabling hands-off, lights-out automated disc production. These systems can be accessed and controlled by applications or authorized users from locations across the organization's network, with intelligent job management software coordinating disc creation requests.

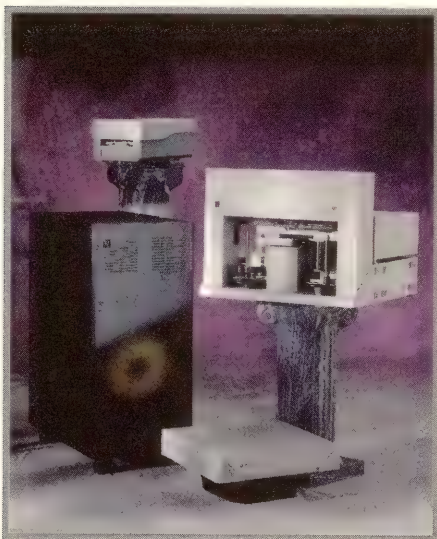
Drawn by these technical and economic advantages, virtually every industry can, and will, find applications for CD-R based electronic imaging. In addition, a technology growth path exists, including next-generation DVD technology, which will further expand the capacity and capabilities of CD technology while protecting current investments in CD-Recordable-based solutions.

— By Andrew Young,
Chairman,
Young Minds, Inc.

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CD-Recordable and CD-ROM Mass Storage Solutions



CIRCLE 489 ON READER CARD

CD Studio is a scalable and reliable CD-R system available for 26 varieties of UNIX as well as Windows NT. CD Studio is a networkable "plug-and-play" system allowing users to produce CDs that include multiple binaries; hybrid discs that support various CD-ROM file system formats such as ISO 9660, Rock Ridge, and Joliet; custom discs and bootable discs.



MPS utilizes two premastering engines working in parallel, coupled with a 6x CD writer and autoloader. This high-volume CD-R system allows enterprise-wide CD-ROM production to be done easily and economically.

The Digital Science Division of Eastman Kodak recently recognized Young Minds' CD Studio and MPS solutions with a "Kodak Integration Excellence" award.

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Kingston's storage products provide solutions specifically designed to reliably support increased storage capacity and system flexibility. Use the Kingston rugged Data Silo expansion chassis, available with up to 9 bays, to accommodate fixed storage needs. Utilize the reliable Data Express enclosures for system internal removable storage.

Combine Kingston's Data Silo and Data Express units for a variety of custom external removable solutions.

MORE ABOUT OUR PRODUCTS

DS500 Data Silo Chassis (9 bay Rack Mount or Tower):

Our DS500 Data Silo Chassis is a steel rack mount or tower, RAID or JBOD (Just a Bunch of Disks) enclosure designed to reliably house (in any combination) up to nine half-height or four full-height and one half-height devices. Used in conjunction with our Data Express removable units, the DS500 can house up to 12 removable devices.

The Kingston DS500 enclosure can support up to 4 host systems and comes standard with a power-on LED indicator, one or more highly-rated, load sharing, hot swappable power supply(ies) and two quick release, hot swappable cooling fans. The DS500 front operator display panel provides a visual and audible warning alarm system that reports dangerous operating conditions.

Each unit is designed to support a variety of storage applications from daisy chain configurations to high-performance RAID solutions. Pre-wired and custom wired configurations are available with 50-pin SCSI 2 and 68-pin

SCSI 3 1/O interfaces. The DS500 is compatible with all popular platforms.

DS100 Data Silo Chassis (1, 2 & 4 bay):

The Kingston DS100 family, of expansion chassis can house up to four 3.5" or 5.25" half-height, or two 5.25" full-height SCSI peripherals. Each DS100 is constructed of rugged steel and is designed to easily withstand the intense heat of today's high performance devices. These chassis are equipped with internal wiring, blank filler panel(s) and highly-rated, auto-ranging, enhanced power supply(ies) and fan(s).

Various available versions of the Data Silo provide flexible options for storage expansion making these chassis ideal for desktop, JBOD and RAID, single and dual port disk arrays. Combine our Data Silo DS100 Chassis with our Data Express removable subsystem units and enjoy the convenience of up to 6 removable devices in a small footprint, desk top storage enclosure.

Data Express (Removable subsystem):

The Kingston Data Express removable subsystems can house 2.5" and 3.5" hard disks or 3.5" front-load type devices and are mountable into any internal or external, half or full-height peripheral expansion bay.

Kingston Data Express units are solidly constructed and employ highly reliable mating connectors. An ID select indicator, device carrier key lock, device activity indicator light, and antistatic insertion guide rails are standard features. Hot swap capability and

solenoid device locks are available options on some models.

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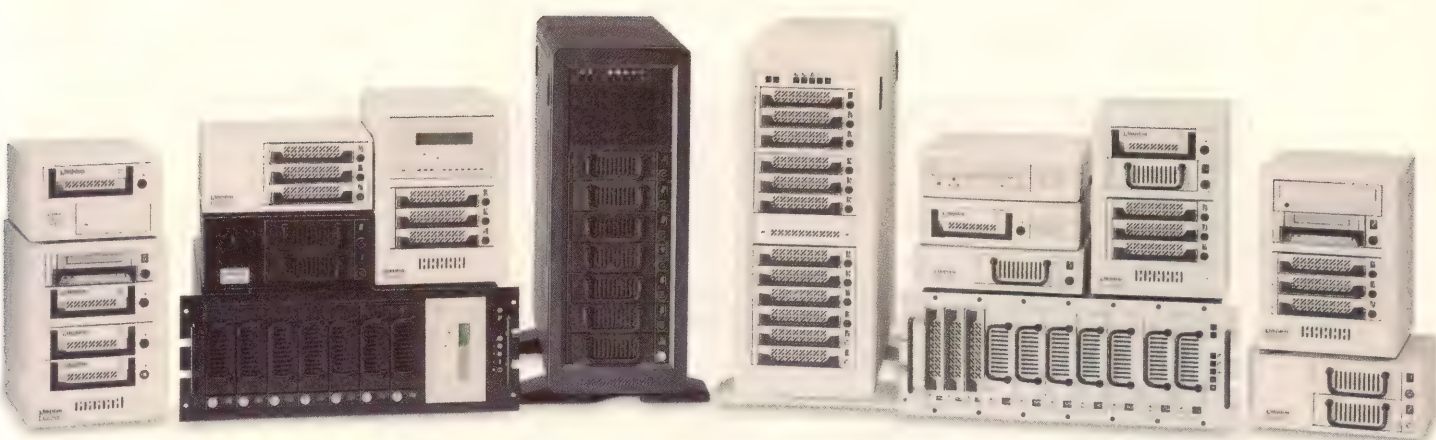
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Because Kingston Storage Products are sold through distribution and integrators, applications are often not reported to us. However, we do know that some of our products have found their way into the White House, aboard Woods Hole's submersible "Alvin" for exploration of the Titanic, into Army bunkers in the Middle East, onto a few of NASA's shuttles, onboard large numbers of Navy ships, on Air Force C130 aircraft, and most recently, have been dropped from pods into Bosnia for information retrieval purposes.

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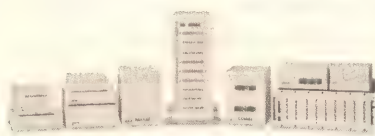
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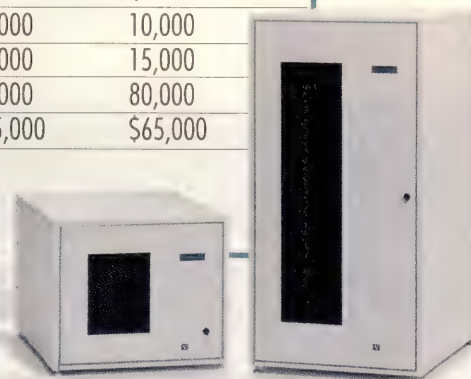
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Drive format	8mm*	8mm*	DLT 4000	DLT 4000
Number of tapes in library	50	150	52	52
Tape drawer(s)	Yes	Yes	No	No
Removable tape boxes	Yes	Yes	No	No
Sustained transfer rate (native)	3MB/sec	3MB/sec	1.5MB/sec	1.5MB/sec
Total capacity (native)	1.25TB	3.75TB	1.04TB	1.04TB
Bar code reader	Yes	Yes	Yes/6-digit	Yes
Number of drives	4 or 5	4 or 5	4	4
Head life (hours)	>20,000**	>20,000**	10,000	10,000
Media uses (passes)	20,000	20,000	15,000	15,000
Drive MTBF (hours)	200,000	200,000	80,000	80,000
Library list price	\$43,995	\$61,995	\$65,000	\$65,000

* Exabyte's recommended 8mm tape—Exatape 170M Advanced Metal Evaporated tape
Sony's recommended 8mm tape—SDX-T3N 170M Advanced Metal Evaporated tape

** Exabyte Mammoth head life—20,000 hours
Sony AIT SDX-300 head life—30,000 hours



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CIRCLE 276 ON READER CARD

Memory Prices

Strike Up A Downbeat

Since January 1996, 16 megabit (Mb) DRAM chip prices have gone down as much as 80 percent. And, according to buyers, analysts and manufacturers, memory prices for 16 Mb DRAM chips had reached rock bottom.

Several theories — from excess stock to predatory pricing — have tried to explain the current market of cheap chips. Regardless of the reason, it looked like a buyers market. And that boded well for those looking to upgrade their systems and increase their memory capacity.

"It's impossible to predict with complete certainty what direction memory prices will take in the future," says Bob Tarantino, president of Data-ram Corp. (Princeton, N.J.). Still he believes that "a further reduction is possible, but clearly it will not be in the same dollar amount as in the last year." Tarantino believes that the prices of a year ago were artificially high, and that the lower prices of today are brought on by a surplus of chips, as well as a number of new manufacturers in the United States, Taiwan, Korea and Japan, among other countries.

Gray Matters

Darin Ferriola, workstation memory product manager at Kingston Technology (Fountain Valley, Calif.), has another theory. He believes the excessively low prices that caused some manufacturers to be accused of selling products below cost was a result of "gray market" prices. The gray market is a group of brokers and import/export companies that sell memory acquired from sources other than memory chip

Memory buyers wonder whether prices will continue to stay in tune with their needs.

DEBORAH SCHWARTZ

manufacturers (for example, computer companies who have excess memory in stock). Because these chips are often gotten at a lower initial cost, chip manufacturers are forced to lower prices, sometimes at a loss, in order to stay competitive in the market.

But, Ferriola now notes that "the amount of product [DRAM chips] in the gray market has dried up. Therefore, the gray market is not driving the price as much." This is resulting in the first increase in memory prices in eight months. "From January until [the end of September], there had been a price erosion in 16 Mb DRAM chips as much as 70 percent to 80 percent," says Bosco Sun, president and CEO of Camintonn ZRAM (Irvine, Calif.). "Now the market has shot up, with some chips showing as much as a 25 percent to 30 percent increase." Sun speculates that this sudden increase is caused by an increased demand by PC vendors, who decided to take advantage of these "rock bottom" prices to stock up for Q4 (a traditionally high demand time for these vendors). "It's a vicious cycle," says Sun. "Prices start to shoot up and more people jump to buy chips before the prices get any higher. This in turn causes more of a shortage and higher prices. There is plenty of supply available as long as peo-

ple buy in an orderly fashion instead of a panicky one."

Ferriola agrees, "We'll see spot price increases till the end of this year, but then they will stabilize again. Prices won't go up as much as they decreased earlier in the year. We should only see a 5 percent or 10 percent increase overall." Glenn Anderson, purchasing manager at Western Scientific, believes the increase in demand from the PC vendors is part of the problem, but its impact and the subsequent "shortage" is being exaggerated. "It's like we're in make-believe," Anderson says. "Prices are higher, but I'm still getting memory quickly."

An Upside Downside

According to Tarantino, expect a decrease in the price of 64 Mb chips over the next year, although not as much of a decline as was seen in the 16 Mb market. Currently, the ratio of capacity difference between the 64 Mb and the 16 Mb chips is 4:1. However, the price differential is at 13:1. "Pricing should be the same [as the capacity] over the next year, with regular decreases about every three to four months." In terms of 64 Mb DRAM, Ferriola believes prices will remain steady through the end of 1996. "In January, with the further proliferation of Windows NT and an increase in the deployment of larger capacity servers, prices will drop a little [for 64 Mb DRAM]."

Sun also believes that 64 Mb DRAM prices will drop starting at the beginning of 1997. "The [64 Mb DRAM] market is supply-limited right now and you end up paying a 3X premium over 16 Mb prices. We're seeing some high-end workstation users who need to max out their memory capacity and pay the higher prices," Sun says. "Next year, 64 Mb prices will decrease as more players get into the market."

REGARDLESS OF why, DRAM prices will be on a rollercoaster ride for the next few months. Unfortunately, buyers can only wait, and follow some old Wall Street advice — "Buy low."

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9x7	768 Mb	2.0 Gb
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Mailing Lists And Path Finders

“I wonder what Fred did for his summer vacation.” How many times have you asked yourself that

question? Well, if you are like most people, never. However, with all the thinking that goes on in the world, it's still statistically possible that someone has. So, I'll tell you. But first, more details about the HP-UX Admin mailing list, and a nice unique path setup script.

MAIL BONDING

For those of you already on the HP-UX Admin list (last check showed 1,300), this is some history, and a bit of yelling. For those not familiar with it, here are some details about how to use the list. First, the history. Bart Muyzer started this great HP-UX systems and network administration tool in 1992. It was originally a patch reference list, called `hpux-patch`. At that time, this kind of information was very difficult to get from HP (which patches do I need?). A couple years later, HP addressed the issue after listening to users from InterWorks, Interex, DutchWorks, UKWorks and all the similar Technical Workstation user groups around the world. So, by spring 1994, the mailing list had outlived its purpose.

Bart then took the suggestions of several people and developed a mailing list called `hpux-admin`, which was, and still is, a needed communications forum. This `hpux-admin` forum is a majordomo handled mailing list, located at the Imaging Center Utrecht in

the Netherlands where Bart is a system administrator. The purpose is to allow admins in need to ask questions of other admins, and get quick responses. There are only two rules:

- 1) Post only questions and summaries.
- 2) Reply answers to the sender (*not* the list).
- 3) Do a summary of your answers, and post it.

OK, so I can't count. I added the third one, because it's amazing how often people forget this part. The reason for the rules: everyone hears the questions, can help the person with the problem quickly and everyone hears the summary of solutions (to eliminate duplicate answers and weed out the chaff). The third rule is the one most often broken. Come on people, if you were helped by people on the list, the least you can do is return the favor and post the solution. Many people do a great job of this, even posting when they spent months finding a solution. Other people seem to take for granted that everyone should help them, but they have no need to return the favor.

This is a great tool. The only problems are with those people unfamiliar with majordomo. How often have you received e-mails that say "subscribe"? People often post to a mail list to subscribe: **WRONG!** You send admin commands to a different address, majordomo can be setup many ways,

here is the `hpux-admin` address: `majordomo@cv.ruu.nl`

Send to that address to subscribe, unsubscribe or issue any majordomo commands (like `help`). A typical message sent to this address would have: `subscribe hpux-admin your@email.addr.here` as the body of the e-mail. Instead of `hpux-admin`, you could put `hpux-admin-digest` to get only one e-mail a day (which includes all the messages sent that day), instead of all the messages as they come in. Response time, however, becomes slower than calling an HP Response Center in some cases. The best you will do is to get an answer, or give help, the next day. The address to send questions to is `hpux-admin@cv.ruu.nl`. The address to send answers to questions to is the sender of the question, *do not* reply to `hpux-admin@cv.ruu.nl`.

To get caught up on all the good stuff that has flown through here over the last few years, check the history of digests at `ftp.cv.ruu.nl/pub/digests/hpux-admin`, or the archive at `hpux.ced.tudelft.nl/HPUX_ADMIN_ARCHIVE`.

Bart's future plans include creating a Web-based searchable archive, which would be a great tool. Remember that *Bart is a volunteer*, so if you have some software already written that might help out here, give Bart a holler at `Bart.Muyzer@cv.ruu.nl`. It might even be appropriate to send him a thank you via e-mail.

TOM'S PATH TO ENLIGHTENMENT

A couple months ago, I put out a little blurb on using the CDE method of sourcing in a `/etc/PATH` file to get needed locations into the search path.

Like /sbin, people need to issue the **mount** command once in a while. *Are you listening HP?!?*

In there, we used the typical, simple method of adding to the search-path: **PATH=\$PATH:/new/location**. The drawback to this is that if a location is added that already exists in **\$PATH**, they will both be in the search path. This can cause the **PATH** to be unnecessarily long, and cause some long search times unless the shell you are using hashes the path (like the **bash** does).

Tom Smith sent in a shell routine using the **sh** type shells (**ksh**, **posix**, **bash**) to remove duplicate entries. I liked it, and decided to share it here (and to get out of writing an article this month). Instead of just dumping the script here, I decided to show just the routine that does the work of keeping new additions unique. Let's suppose, that we want to add all directories in /etc/**PATH** to the current search path in our login startup file. The /etc/**PATH** file has the format of a **PATH** variable, that is:

```
/sbin:/some/where/else:/last/place
```

We could do:

```
PATH=$PATH:`cat /etc/PATH`
```

as described in a previous column. But a better method, as Tom pointed out, would prevent duplicate entries, like this:

```
1 if [ -r /etc/PATH ]
2 then etcpath=`sed 's:/ /g' /etc/PATH`
3 else etcpath=""
4 fi
5 for dir in $etcpath
6 do if [ -d $dir ]
7 then echo $PATH | grep -q $dir
8 if [ $? -ne 0 ]
9 then PATH=$PATH:$dir
10 fi;fi
11 done
12 export PATH
```

So, how does it work? Lines 1 through 4 set the variable **etcpath** to either null (if you cannot read /etc/**PATH**) or to a space separated list of the directories listed in the /etc/**PATH** file. The reason for the **sed** substitution of **:** for spaces is that we will be feeding the list of locations to a **for** loop. We could have changed the **IFS** variable to handle this for us,

A Texas Ranger In Dutch Wonderland

Oh yes, my vacation. I bet you thought I forgot, didn't you? The user groups, DutchWorks and the Dutch Users Group HP, as well as HP Nederland, got together in organizing a great conference. It seemed like a great vacation. It was held at an old monastery, now a convention hotel. After hopping on a plane Sunday in Corpus Christi, Texas, I arrived in the Netherlands on Monday afternoon, feeling quite refreshed. After spending the night in my rather monkish room, I gave a full day seminar on CDE administration, while trying to listen through the walls to the other seminars going on around me. There was OpenView, Windows NT interactions with UNIX and Advanced HP-UX Admin. I would have liked to attend all three — the usual conference dilemma.

The next day was the start of the official conference. And it must have been jet lag that attacked me as I sat for the opening speech which lasted almost an hour. I seemed to be having trouble concentrating. I wondered if it was the music they played before the opening that messed up my mind — sort of a combination of a Gregorian chant and the theme song from the Munsters TV show. Then I noticed the speaker was talking in Dutch. Ah, no wonder. What did you expect from a UNIX geek?

So, I got up and visited the Vendor Arcade — a great planning move by the organizers. The arcade was open all the time, so you could always drop in and see what the vendors had to offer. There were over 50 vendors there. It was great! In fact, there were so many vendors combined with HP support as well as all the volunteers from the users group, the conference paid for itself. In fact, the conference, including the seminars, was free to attendees. Although there were four track presentations Wednesday through Friday, I had to get back to work by Wednesday afternoon, so off to the airport for another refreshing 10-hour plane ride.

God, I love vacations.

but that is not available in the Bourne Shell. Lines 5 through 12 do all the work of making the additions unique.

Line 5 sets up a loop, with the variable **dir** set to the first directory in the list from **\$etcpath**. Lines 6 to 10 are done for each directory in the list. Line 6 tests to see if the directory to be added exists, and is a directory. If true, line 7 sends the current **\$PATH** contents to **grep** to see if **\$dir** is already there. The **-q** option to **grep** means do it without output (quiet). On line 8 the **grep** command return status (**\$?**) is tested. If the new directory is already in the **PATH**, a **0** was returned, so we return to the top of the **for** loop. If a non-zero status was returned (probably

a **1**), the new directory is not in the **PATH**, so we add it on line 9, then return to the top of the loop with lines 10 and 11. Line 12 exports the **PATH** variable for future shells and programs.

This method could easily be extended to cover all new additions. Using just lines 5 through 12, line 5 could be changed to list desired additions, and the rest would ensure unique additions:

```
for dir in /new/dir /ano/ther /sbin
```

Thanks Tom.

— Pick up any technological tidbits on your summer vacation? Tell Fred at frederm@aol.com.

Would you like to continue to see articles on this topic?
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Applications Without An Attitude

Application development environments have come a long way since the early 1960s when

Grace Hopper promoted the idea of programming in a language friendlier than assembler. If you haven't heard of Grace Hopper, she was instrumental in defining the Common Business Oriented Language (COBOL) which helped turn computing from a purely mathematical exercise into a serious business tool. However, maximizing the effectiveness of any software development effort requires more than just making it easier for developers to write quality code as quickly as possible. To be truly effective over the long-haul, a software application must be manageable.

BEST TRAITS FORWARD

A manageable application usually possesses the following characteristics:

- **It doesn't require babysitting.** A manageable application will run without constant, undivided attention from the nearest systems administrator.
- **It's humble.** A manageable application doesn't behave like it is the only application in the entire organization. Instead, it communicates regularly with a central management console responsible for managing all other critical applications across the organization.
- **It talks long distance.** A manageable application can communicate with a central management console even if it is located thousands of miles away.
- **It yells when it hurts and heals itself when possible.** When a manage-

able application slows down or hangs up, it warns the central management console long before end-users notice a problem.

- **It knows its place.** A manageable application understands its priority with respect to other applications running on the same server or network. High priority applications proactively grab disk space and memory when they need to; low priority applications relinquish the same and die if need be, to keep high priority applications running. If a manageable application dies, it reboots itself when appropriate.

- **It helps out with upgrades.** New versions of a manageable application can be securely distributed to remote clients via electronic software distribution rather than via time-consuming manual processes.

TELL ME WHERE IT HURTS

Unfortunately, very few distributed client-server applications are truly manageable. Most require constant babysitting. Few are willing or able to communicate their status by any other means than sending arcane messages to an operating system logfile. But, interest in applications management is growing dramatically. So, vendors are responding with various approaches that may be categorized as intrusive, non-intrusive or a combination of both.

Intrusive approaches require that the

application be written (or rewritten) to include *hooks*, which are areas of code that write messages describing a process status or a problem. For example, there may be a hook indicating where a transaction begins and ends, facilitating tracking of response time. These hooks are similar to *exits*, that are familiar to IBM systems programmers. The benefit of the intrusive approach is that the application can be fully instrumented to yell loudly when it hurts. The number of places it yells, as well as the descriptiveness of the messages, is limited only by the creativity and perseverance of the applications developer. The downside is that instrumenting an application requires time and careful planning, and programmers cannot always anticipate what types of messages would be helpful. Additionally, it is expensive, if not impossible, to retrofit older existing applications.

DON'T TREAD ON ME

Non-intrusive approaches don't require instrumenting; rather, they determine process status and priority information from secondary sources such as the operating system or the database on which the application is running. While non-intrusive approaches are less painful to implement, they also yield far less information about what might be wrong when an application crashes or slows down dramatically. However, it is often possible to automatically reboot a failed application processes using a non-intrusive approach so even a little bit of manageability is better than none at all.

HP offers several products for applications management.

Non-Intrusive

IT/Operations (IT/O; formerly known as OperationsCenter) includes a central console and distributed intelligent agents. The console portion is capable of watching multiple servers and workstations simultaneously; an intelligent agent resides on each server or workstation. IT/O agents pick up information from the operating system, encapsulating logfiles of applications and systems, extracting message information and checking status, and consolidating the information before forwarding it to the central console.

Intrusive/Non-Intrusive

HP MeasureWare displays on a single console data measuring the performance of networks, applications and databases collected by selected HP and non-HP agents. These include three non-intrusive agents: MeasureWare agent for server statistics, the HP NetMetrix agent for network statistics and the BMC Patrol agent for database statistics. Information also is collected from the intrusive MeasureWare Transaction Tracker facility which measures application response time. Application developers must instrument their applications with Transaction Tracker facility to obtain response time data.

Whereas IT/O agents trigger alarms based on specific messages, MeasureWare agents can apply algorithms to compare current service levels, including response times, transaction rates, resource utilizations and bottleneck indicators, against predefined alarm thresholds. MeasureWare agents are capable of tracking approximately 30 system metrics.

Non-Intrusive With

Intrusive Options

EMANATE is an extensible agent that's an SNMP-based facility bundled free with every copy of HP-UX 10.x. A master agent in HP-UX 10 collects statistics from connected subagents, and a MIB II subagent included in the bundle tracks system up time and various I/O statistics. Customers can optionally purchase a subagent development kit for building SNMP subagents capable

of monitoring HP-UX processes in critical applications.

Of course, there are other vendors offering applications management solutions. Products competing with HP IT/O include Computer Associates' CA-Unicenter and IBM-Tivoli/Enterprise Console. HP MeasureWare is similar in some respects to IBM-

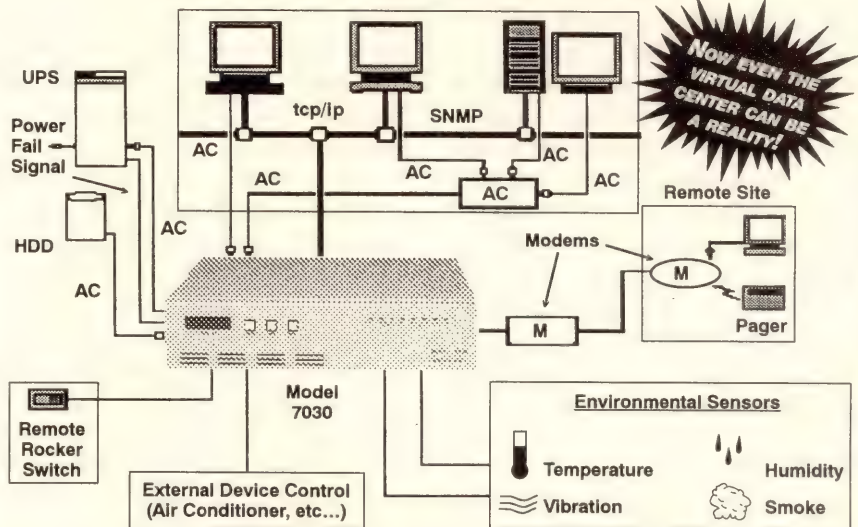
Tivoli/Sentry. And extensible agent facilities can be found in other operating systems such as Windows NT.

— *Are your apps in daycare? Contact Jill at jill@int.snmp.com for some remedial solutions.*

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Good To The Last App

A fter recently teaching a Java programming course at the University of Wisconsin, I

discovered something I thought was rather odd. My attendance records showed that while the requisite number of Web content developers, Web masters and Internet Service Providers (ISP) were well represented, there was no one from corporate IT. But that doesn't really surprise me, because I think many enterprises still think Java is an immature technology built for nothing better than spicing up an eccentric Web page with animation and fancy graphics. Yet, that notion couldn't be further from the truth.

JAVA, JAVA, JAVA

In fact, Java is a natural development in the client-server computing model which happens to include applications and the Internet. However, senior IT managers don't see it that way. A recent research project conducted by Alexander and Associates (New York, N.Y.), a management consulting firm, indicated that while lower-level IT managers and programmers are bullish on Java, their enthusiasm doesn't extend to middle or top-level IT management.

The Alexander survey also suggested that senior IT managers currently perceive Java as an immature language without the necessary "standardization." Java's clear advantages over other programming environments — including cross-platform development,

developer efficiency and real-time applications distribution — were not yet perceived as significant enough advantages for motivating IT managers to move to Java for general purpose development.

It's no wonder. In many enterprises, applications development managers are bombarded with tools that purportedly make programmers more efficient. Managers can find it difficult to set guidelines for which tools to choose for specific projects. In the absence of guidelines, developers are left to choose tools on their own. The result is a confusing mixture of technologies that are often dependent on the availability of specific developers and specialists.

A PLUS OVER C++

Java may seem to add to all the confusion. But hey, Java is ideally suited for many uses in the enterprise. For example, it can be used to develop enterprise client-server applications in place of C++. Such a strategy provides the advantages of lightweight code with shorter development times. Because 50 percent of a C++ programmer's time is spent on memory management issues, Java's built-in memory management (called "garbage collection") will reduce development times. Consequently, Java has a place in traditional client-server development.

On the other hand, Java has a misunderstood place in delivering information and applications over the Internet. Much has been made of Java's ability to deliver multimedia services, but the primary benefit to IT departments are custom applications brought to clients on an *intranet*. The ability to combine traditional access to databases with customized applications *delivered on the fly* is a substantial advantage compared to traditional approaches that *develop special code for every client*. Combined with the ability to deliver the most recent version of an application with the click of a pointing device, Java gives the IT organization a modern development environment with software distribution built-in.

Despite strong support from early technology adopters and interested content developers, many senior IT managers and CIOs remain wary. For many organizations, lower development costs and the ease of software distribution alone would be enough to investigate using a new platform. Intriguingly, the Alexander survey also found that more than 70 percent of Fortune 1000 companies will be operating intranets in the next three years. One-third of those surveyed plan to use Java for intranet development. Those plans tell me that, despite some initial reluctance, I'll soon see IT managers grinding it out in my Java classes. I can't wait.

Is Java too bitter for your taste? Percolate a new brew with Mark at 73740.1101@compuserve.com.

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new Products

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STORAGE

ADIC

ADIC and Stac Inc. announced the certification of Stac's Replica 2.1 disaster recovery and backup software with support for ADIC's DAT and DLT autoloaders — ADIC's 1200 Series, VLS 4mm Series and VLS DLT Series. This gives users immediate access to up to 490 GB of stored data, and native transfer rates up to 300 MBps.

Replica's Logical Object Replication Technology enables complete server recovery, including DOS and NetWare, as well as user data, with just three keystrokes, two disaster recovery disks and a tape. Also, system administrators can store replicated data on the same server, a standby server or a streaming tape drive, and then mount the tape directly as a NetWare volume with full NetWare security in place.

Contact ADIC, 10201 Willows Rd. NE, P.O. Box 97057, Redmond, WA 98073; (800) 336-1233; support@adic.com; www.adic.com.

Circle 400 on reader card

Artecon

Artecon released their Lynx 40 GB 8mm tape drive. It has a transfer speed of 6 MBps (compressed), and cache has also increased from 500 KB to 4 MB. The Lynx 8mm tape subsystem has interlocking legs for modular stackability, external SCSI and AC jumpers for reducing cable tangles and SCSI bus length, internal PCBs which increase overall subsystem reliability by eliminating cable connections and external removable fans.

Price is \$7,295.

Contact Artecon, 2460 Impala Dr., Carlsbad, CA 92008; (619) 931-5500; websales@artecon.com; www.artecon.com.

Circle 399 on reader card

Box Hill Systems Corp.

Box Hill announced the Echo Box, their autoloading, unattended, dual drive DLT media changer. With Echo Box, users can simultaneously create two sets of backup tapes. Also, Box Hill's Tape Mirroring Software (TMS) allows for real-time tape mirroring.

Other features include: one or two high-performance DLT drives 3000 (15-30 GB) or 4000 (20-40 GB); 10 cartridge magazine capacity; 150 GB to 400 GB capacity; 6 MBps transfer rate; and LCD front-panel display of library status and mode select button for automatic or manual operation.

Contact Box Hill, 161 Ave. of the Americas, New York, NY 10013; (800) 727-3863; info@boxhill.com; www.boxhill.com.

Circle 398 on reader card

Breece Hill Technologies

Breece Hill Technologies announced the availability of the entry-level, scalable Q2-15! DLT storage systems. It stores over 1 TB of data with 15 cartridges per library storage module. Additionally, it acts as one integrated unit occupying only one SCSI target ID. It is available in rackmount, desktop or deskmount configuration. The Q2-15! features one or two 200XT, 4000 or 7000 DLT drives, an integrated bar code reader and a removable 10 cartridge magazine.

The Q2-15! supports software backup and HSM applications running on UNIX, Windows NT and Novell. Pricing for the Q2-15! with two DLT 4000 drives is \$22,000.

Contact Breece Hill, 6287 Arapahoe Ave., Boulder, CO 80303; (800) 941-0550; breece_hill@csn.net; www.breecehill.com.

Circle 397 on reader card

Digital Equipment Corp.

Digital Equipment Corp. introduced the Enterprise Storage Array (ESA) to its StorageWorks product family. All Enterprise Storage Arrays offer RAID levels 0, 1, 0+1, 3 and 5. All feature fully-redundant components including power supplies and fans. Included with each array is StorageWorks Command Console software, an easy-to-use multiplatform configuration and management tool. The Command Console allows simple configuration, and provides at-a-glance summary status through a new graphical interface. Its fault isolation and reporting feature allows remote notification, escalation and diagnosis in the event of a component failure.

StorageWorks ESAs support multiple open systems platforms including HP, Digital UNIX, Sun, Windows NT, OpenVMS and IBM. StorageWorks ESA pricing starts at \$195,000, and includes on-site installation and setup.

Contact Digital StorageWorks, 334 South St., Shrewsbury, MA 01545; (800) STORWORK; storageworks@digital.com; www.storage.digital.com.

Circle 395 on reader card

FWB Hammer

FWB Hammer shipped SledgeHammer* Pro FT in 20 and 24 GB capacities in table, tower and rackmount enclosures. In the event of a drive failure, the spare auto swap drive in the SledgeHammer*Pro FT will automatically assume operations of the failed drive, without interruptions of operations or corruption of data. When automatic sparring occurs, data is reconstructed in the background, allowing the network to remain operational. Additionally, SledgeHammer*Pro FT drives are installed in hot-swappable drive shuttles.

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Contact FWB Hammer, 1555 Adams Dr., Menlo Park, CA 94025; (415) 833-4605; sales@fwb.com; www.fwb.com.

Circle 394 on reader card

IEM

IEM Inc. announced the extension of its lights-out backup solutions with high-speed, high-capacity, multidrive DLT libraries combined with Alexandria network backup software. DLT libraries are available from IEM with two to nine drives, and 28 to 264 cartridges. DLT 4000

technology boast 40 GB per cartridge capacity and up to 3.0 MBps sustained transfer rate (with 2:1 compression). The libraries are also compatible with HP's OmniBack II and other backup packages.

Contact IEM, P.O. Box 1889, Fort Collins, CO 80522; (800) 321-4671; info@iem.com; www.iem.com.

Circle 393 on reader card

Legato

Legato Systems Inc. announced NetWorker 4.1 for Novell's IntranetWare/NetWare 4.11, which provides a network management solution for NetWare-based networks, and mixed NetWare, Windows NT and UNIX networks. It offers a performance enhancement where parallelism is increased from 16 to 32 simultaneous backup sessions. NetWorker 4.1 for NetWare also supports NetWare SFTIII (System Fault Tolerant).

Other features include: SmartMedia which allows for "pools" of backup tapes to be created, each with its own set of rules specifying how tapes in the pool are to be used; Windows-based setup which allows administrators to install the product on any NetWare server on the network from any CD-ROM-equipped workstation; enhanced autochanger support option which allows NetWorker 4.1 for NetWare to back up to, and restore from, as many as five autochangers simultaneously to provide an effective storage capacity growth path and greater redundancy alternatives.

NetWorker 4.1 pricing begins at \$3,000.

Contact Legato Systems Inc., 3145 Porter Dr., Palo Alto, CA 94304; (415) 812-6000; sales@legato.com; www.legato.com.

Circle 390 on reader card

MDI

Micro Design International Inc. (MDI) offered its LAN attach CD-ROM server, CD-Express Connect, to Windows NT environments. CD-Express Connect is a multiprotocol, mini CD-ROM server for the distribution of CD-ROM data to LAN and Web clients. It automatically configures itself as a NetWare, Web, Network File System and Windows NT server. MDI's CD-Express Connect provides network sharing of CD-ROM data without drawing resources from existing servers, and requires no other dedicated servers, special drivers or administration setup.

Contact MDI, 6985 University Blvd., Winter Park, FL 32792; (800) 228-0891; info@mdi.com; www.mdi.com.

Circle 388 on reader card

MGV Memory

MGV Memory announced the availability of memory upgrades for HP's NetServer LH Plus series. The dual inline memory modules (DIMM) will be available in 16, 32, 64 and 128 MB capacities. The DIMMs are designed with 64-bit EDO RAM technology and offer ECC which automatically detects and corrects memory errors.

HP's Pentium-based HP NetServer LH

Plus series is scalable to 166 MHz and comes standard with 32 MB of memory. The system can be upgraded to a maximum of 512 MB with 'MGV's DIMMs. Prices range from \$429 to \$4,459.

Contact MGV Memory, 29B Technology Dr., Ste. 100, Irvine, CA 92718; (800) 440-4648; sales@mgvgroup.com; www.mgvgroup.com.

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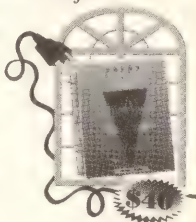
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CIRCLE 255 ON READER CARD

new products

Most Inc.

Most Inc. shipped its new Jupiter 2 direct-overwrite magneto-optical (MO) drives. The 3,600 rpm drives provide an internal sustained read and write transfer rate of up to 4 MBps and a burst transfer rate to the host of 10 MBps, making them solutions for graphic-intensive, animation and real-time video applications, as well as Web development work and disk mirroring.

The Jupiter 2 is a 2.6 GB drive that combines Most's experience in producing opto-mechanical assemblies and its drive manufacturing expertise with Nikon's Light Intensity Modulation-Direct OverWrite (LIMDOW) technology.

Contact Most Inc., 11205 Knott Ave., Cypress, CA 90630; (714) 898-9400.

Circle 384 on reader card

Nikon Optical Storage

Nikon Optical Storage shipped a high-capacity, high-speed direct-overwrite magneto-optical (MO) drive. The new 2.6 GB Beluga drive offers industry-standard compliance and multiple media sources. It is based on Nikon's LIMDOW (Light Intensity Modulation-Direct OverWrite) technology. With LIMDOW capabilities, the overwriting process is streamlined from the two-pass process required with present MO systems to a single pass at a full 3,600 rpm. It also has ability to achieve a sustained read and write transfer rate of up to 4 MBps and a burst transfer rate of 10 MBps.

Price is \$2,450 for the Beluga drive, and \$129 for the 2.6 GB LIMDOW MO media.

Contact Nikon Optical Storage, 1399 Shoreway Rd., Belmont, CA 94002; (415) 508-4674; www.mo-nikon.com.

Circle 383 on reader card

Overland Data Inc.

Overland Data announced DLT LibraryXpress, an automated library. It has a 10-cartridge magazine; one or two drives; 150 to 400 GB capacity in a single module; up to 6 MBps transfer rate; designed to scale up to 3.2 TB; SmartScale Storage design and pass-through port; and full connectivity with major backup and HSM packages.

Operating system and platform software support is ensured with compatibility to all leading software packages for: Novell NetWare, IBM/AIX, SCO, HP-UX, SunOS, Solaris, MacOS and Windows NT.

Contact Overland Data, 8975 Balboa Ave., San Diego, CA 92123; (619) 571-5555; odisales@ovrland.com; www.overlanddata.com.

Circle 382 on reader card

Qualstar

Qualstar unveiled the TLS-4000 automated tape libraries which support the Exabyte Mammoth tape drives. These drives offer up to 40 GB capacity (compressed) on a single cartridge with data transfer rates of up to 6 MBps. TLS-4000 libraries are designed for enterprisewide backup, high-capacity near-online storage and data archive applications. The TLS-4000 family comprises eight models housing from one to six tape drives, and up to 120 tape cartridges yielding capacities from 70 GB to 4.8 TB.

Contact Qualstar, 6709 Independence Ave., Canoga Park, CA 91303; (818) 592-0061; sales@qualstar.attmail.com; www.qualstar.com.

Circle 381 on reader card

Quantum

Quantum Corp. reduced the prices of its solid state disk families, the Quantum ESP5000 and the Quantum ESP3000 series, by as much as 20 percent for its OEM and distribution customers. Solid state disks offer a competitive advantage for minicomputer and server systems operating in heavy-duty computing environments that are response time or bandwidth dependent. With the price reduction, the new prices start at \$10,000.

Contact Quantum Corp., 500 McCarthy Blvd., Milpitas, CA 95035; (800) 624-5545; www.quantum.com.

Circle 380 on reader card

Smart Storage

Smart Storage Inc. released its newest version of SmartCD for access. The new version includes an application manager that provides a method for CD access to all network users in Windows NT or Novell NetWare environments. For users running on Windows 3.11, Windows 95 or Windows NT clients, the application manager's GUI makes accessing CDs over a network as simple as clicking on an icon. For network administrators, the software provides easy-to-use, remote administration of CDs.

Contact Smart Storage Inc., 100 Burt Rd., Andover, MA 01810; (508) 623-3300; info@smartstorage.com; www.smartstorage.com.

Circle 377 on reader card

Spectra Logic

Spectra Logic announced that its Alexandria Backup Librarian now supports IBM's 3494 Tape Library Dataserver using the IBM Magstar 3590 tape drives. Spectra Logic's

Library Backup Personality for the 3494 Tape Library enables attachment of the 3494 with Magstar drives to multiple hosts running Alexandria software; each IBM 3494 may be shared simultaneously by up to 16 different hosts in heterogeneous UNIX environments.

Contact Spectra Logic, 1700 N. 55th St., Boulder, CO 80301; (303) 449-6400; alexandria@spectrallogic.com; www.spectrallogic.com.

Circle 376 on reader card

Storage Computer

Storage Computer Corp. announced that their RAID 7 Storage Servers have been selected by the ChatCom Inc. for integration into their Chatterbox Corporate Series product line. ChatCom will resell the RAID 7 Storage server under the ChatRAID product name to address their end-user's mission-critical applications requiring high levels of data protection. The product is available with ChatCom's ChatterBox Corporate Series Models 2020 and 2040.

Contact Storage Computer Corp., 11 Riverside St., Nashua, NH 03062; (603) 880-3005; techinfo@storage.com; www.storage.com.

Circle 375 on reader card

Unisys Corp.

Unisys Corp.'s Storage Systems Division (SSD) released its Open Data Module 3900 (ODM3900) for data storage. The ODM3900 is an injection molded plastic disk enclosure, supporting RAID levels 0, 1, 0+4 and 5, intermixable in a single subsystem. The controller also supports JBOD, cache (4 MB standard, expandable to 128 MB using industry-standard SIMMs), and a hot spare with dynamic rebuild. It can be populated with up to seven disk drives mounted in hot pluggable device cages. Availability features include standard dual redundant fans, and optional dual redundant, current sharing power supplies.

Price for a fully populated model starts at \$16,190.

Contact Unisys Corp., Storage Systems Division, MS 240, 25725 Jeronimo Rd., Mission Viejo, CA 92691; (800) 448-1424; ssdnet@mv.unisys.com; www.unisys.com/products/ssd.

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The Great NT Debate



Nick Savander
Director of
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Windows NT versus UNIX has taken on an emotive tone, which is disproportionate to the relevance of NT or even UNIX in the context of the wider IT infrastructure. This debate has been fueled by companies who have taken a stand either for or against NT, both of which, is at odds with their claims to be committed to open systems computing.

There are IT customers who claim a preference for one or the other and do not entertain alternative solutions. The buying preferences in the market are complex: the typical technical user choosing NT is doing it based on price, simplicity and ease of integration into office environments. Whereas the typical UNIX user will choose UNIX because of performance, enterprise functionality and capability, as well as integration into corporate mainstream IT.

The Windows NT market is segmented into two different kinds of customer. The downsizer — the corporation that needs added value, interoperability and advisory selling, and wants a solution that fits into the infrastructure, plugging and playing with existing applications while being manageable. This is a traditional HP enterprise customer profile.

On the other hand, the larger portion of the current NT segment is the upsizer — the user who is currently using Windows 3.11 or Windows 95 and needs more performance. It is natural for them to go to NT. Price and simplicity will be the primary concerns because they are used to buying from the channel and shopping around for components. Therefore, there should be two solutions: one will be the commodity oriented best buy, and the other will be an enterprisewide environment, with middleware, manageability, interoperability and consulting.

The above implies a two-tier hardware offering: the commodity type being satisfied by an Intel machine and the enterprise type by UNIX machines. However, just as most customers will opt for a mixed operating environment, both will have a mixed hardware environment.

The business proposition of NT is shrink wrapped, high volume, 100 percent compatible. Therefore, to unbundle the shrink-wrapped core

value from NT, like Digital has done, is not the right value proposition for the user or the software developer. If you accept that the proper platform for NT is Intel, there are much fewer differentiators amongst the Intel platform suppliers — namely price, availability and time to market.

Traditionally, the engineering environment is accustomed to a two-tier operating environment — this usually consisted of a UNIX workstation environment in front and a proprietary supercomputer in the back. The future technical environment will be three tiered.

The supercomputer will still be there for the compute-intensive tasks, although this machine is rapidly moving away from proprietary toward open systems architectures. Then, there will be a middle tier, consisting of small scale application and compute servers, typically UNIX. Then, on the client side two segments will evolve.

First, the basic design/drafting/documentation segment which has tight links to the Office environment, where the benefits of Microsoft and its integration into the PC environment are clear.

Second, the high-end design/analysis segment, which is using modeling software and other analysis tools that benefit from being coupled with the compute server or supercomputer. Over half of the current technical desktop users will continue to be in the high end and will require more than just the standard off-the-shelf solution.

Looking at the leading software vendors who have announced NT versions, many are not sure about how much volume NT will produce. The risk for the software vendor is that the customer has an expectation of UNIX-like service at a PC-like price.

Looking back to when the subject of UNIX vs. proprietary operating systems was still a "hot" topic, it's rather disappointing to see so much debate over UNIX and NT. The IT industry should have learned its lesson and realized that customers drive the computer industry, not IT vendors. Windows NT will find its place in customers' IT strategies and infrastructures in the same way that UNIX did. — *Nick Savander is director of sales and marketing for Technical Computing with HP's CSO Europe.*

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